

FACE: 2024

**Mona
Lisa's
Face**



**FACE IS UNIQUE - skin
of face is thin and
moveable**

**'Window of the soul' - Face has
moveable skin for facial
expression**

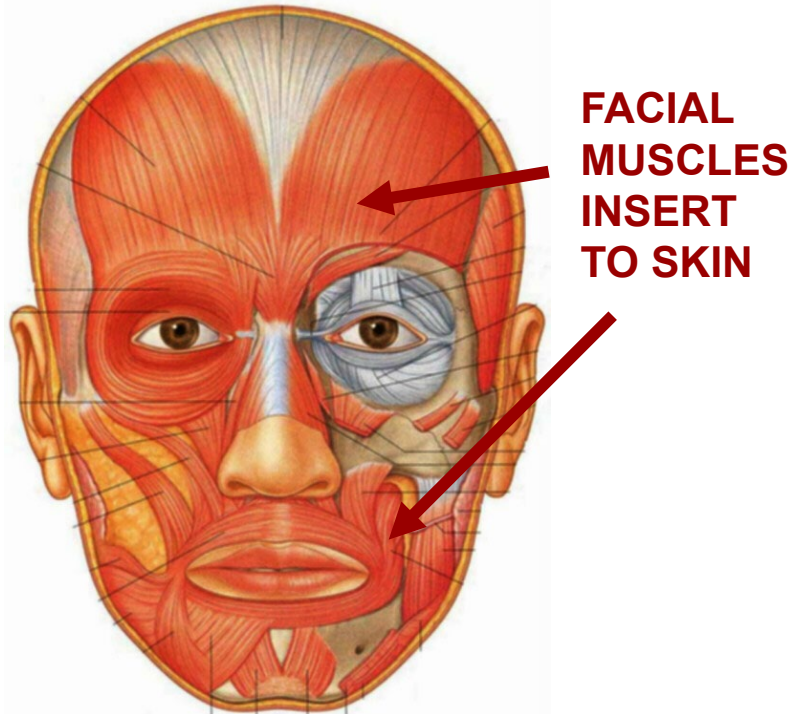
**Mona
Lisa's
Hands**



**Facial Paralysis -
Bell's Palsy - face
disfigures**

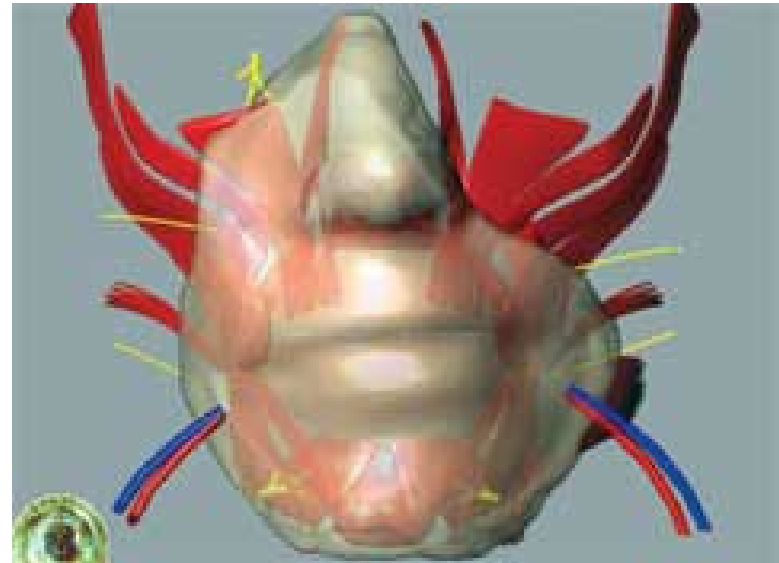
OVERVIEW OF FACIAL MUSCLES

FACIAL MUSCLES HAVE UNIQUE PROPERTIES



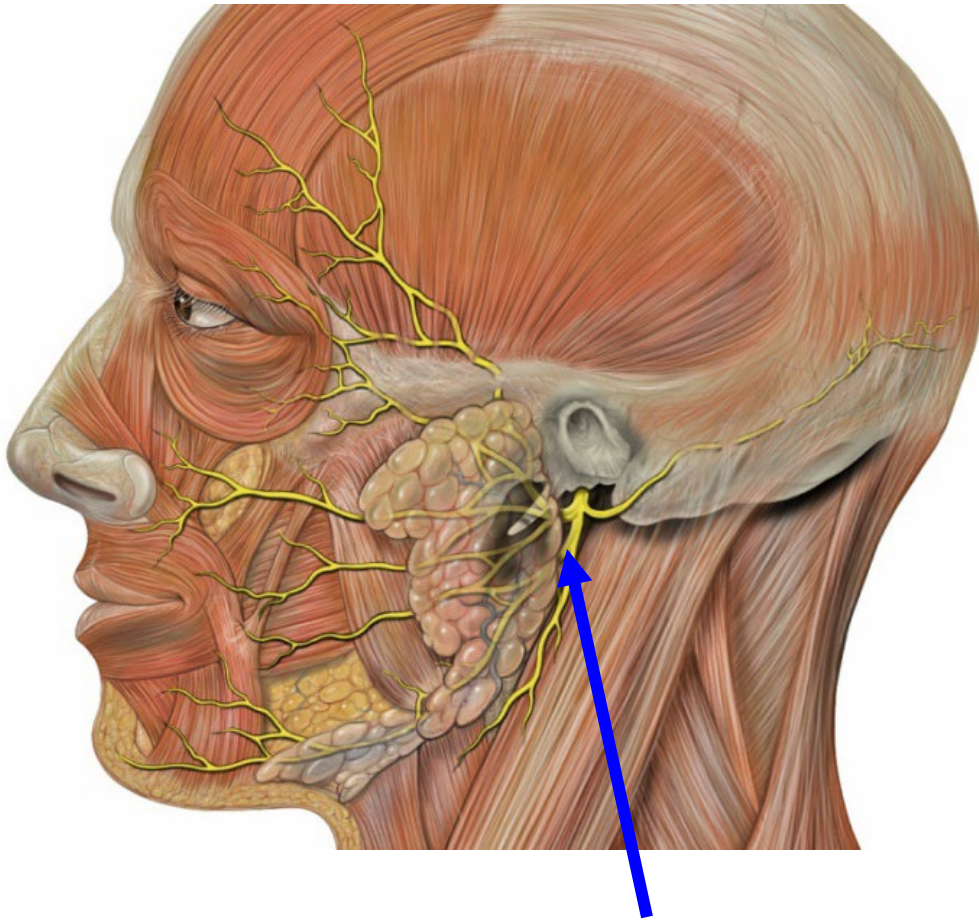
A. Facial muscles are embedded in superficial fascia - take origin from underlying bones (mostly); insert onto skin

FACIAL TRANSPLANT



Note: In severe damage to face, facial transplants are required because muscles of facial expression insert onto skin rather than tendons (therefore, cannot use grafts of other body muscles).

OVERVIEW OF FACIAL MUSCLES



**FACIAL NERVE
(Cranial Nerve VII)**

B. Neural control of Facial muscles - Facial muscles are under both voluntary and emotional (involuntary) control.

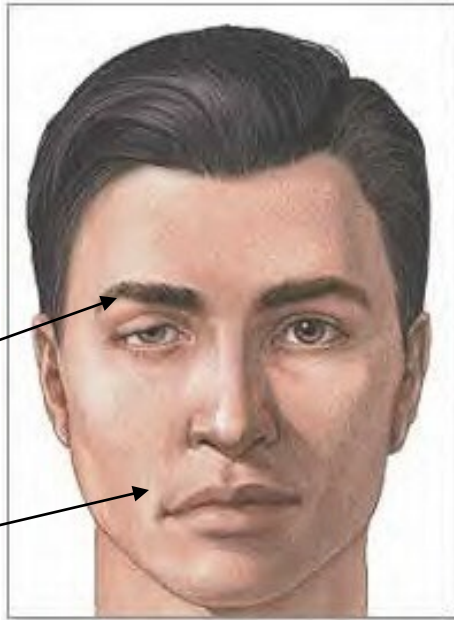
C. Detecting action of Facial muscles - muscles of face have no (or very few) muscle spindles; muscle contractions are thought to be detected by stretching of skin.

OVERVIEW OF FACIAL MUSCLES: FACIAL PARALYSIS

FACIAL PARALYSIS - BELL'S PALSY - CN VII

'drooping' eyebrow

'drooping' upper lip

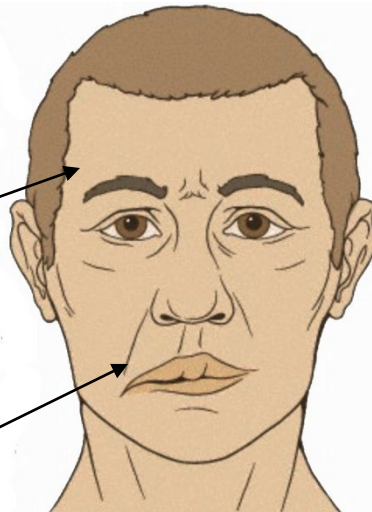


BELL'S PALSY- Lower Motor Neuron (Alpha motor neuron) disorder of Facial Nerve (CN VII): associated with viral infection (herpes simplex); Symptoms unilateral: sudden onset paralysis of all facial muscles on one side; SYMPTOMS: drooling; inability to close eye; loss of taste to anterior tongue; pain in or behind ear; hyperacusia

UPPER MOTOR NEURON LESIONS

MUSCLES OF UPPER FACE NOT AFFECTED

'drooping' upper lip



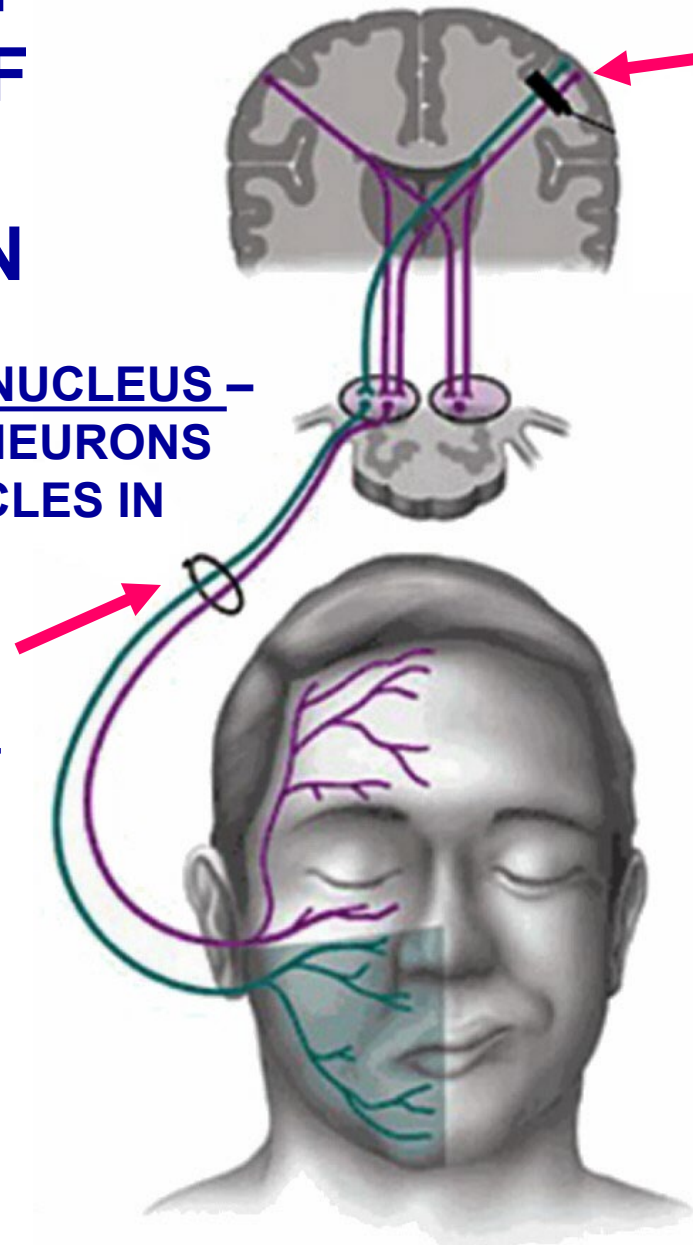
UPPER MOTOR NEURONS DISORDERS OF VII - 'sparing' of upper face - After cortical strokes, often only muscle of lower face are paralyzed on one side, muscles of upper face are not paralyzed (ex. brow, orbicularis oculi); cortical projections are bilateral to upper face.

CONTROL OF MUSCLES OF FACIAL EXPRESSION

FACIAL MOTOR NUCLEUS –
ALPHA MOTOR NEURONS
TO FACIAL MUSCLES IN
BRAINSTEM

LOWER MOTOR
NEURON LESION
- ex. BELL'S
PALSY -

AFFECTS ALL
MUSCLES OF
FACIAL
EXPRESSION



UPPER MOTOR
NEURON LESION -
ex. CORTICAL
STROKE (vascular
occlusion)

AFFECTS ONLY
MUSCLES OF LOWER
FACE ('SPARING OF
UPPER FACE')

UPPER FACE
CONTROL IS
BILATERAL (both sides
of Cortex)

LOWER FACE
CONTROL IS
UNILATERAL (ONLY
CONTRALATERAL
CORTEX)

OVERVIEW OF BLOOD SUPPLY TO HEAD

1) COMMON CAROTID ARTERY DIVIDES TO EXTERNAL AND INTERNAL CAROTID ARTERIES

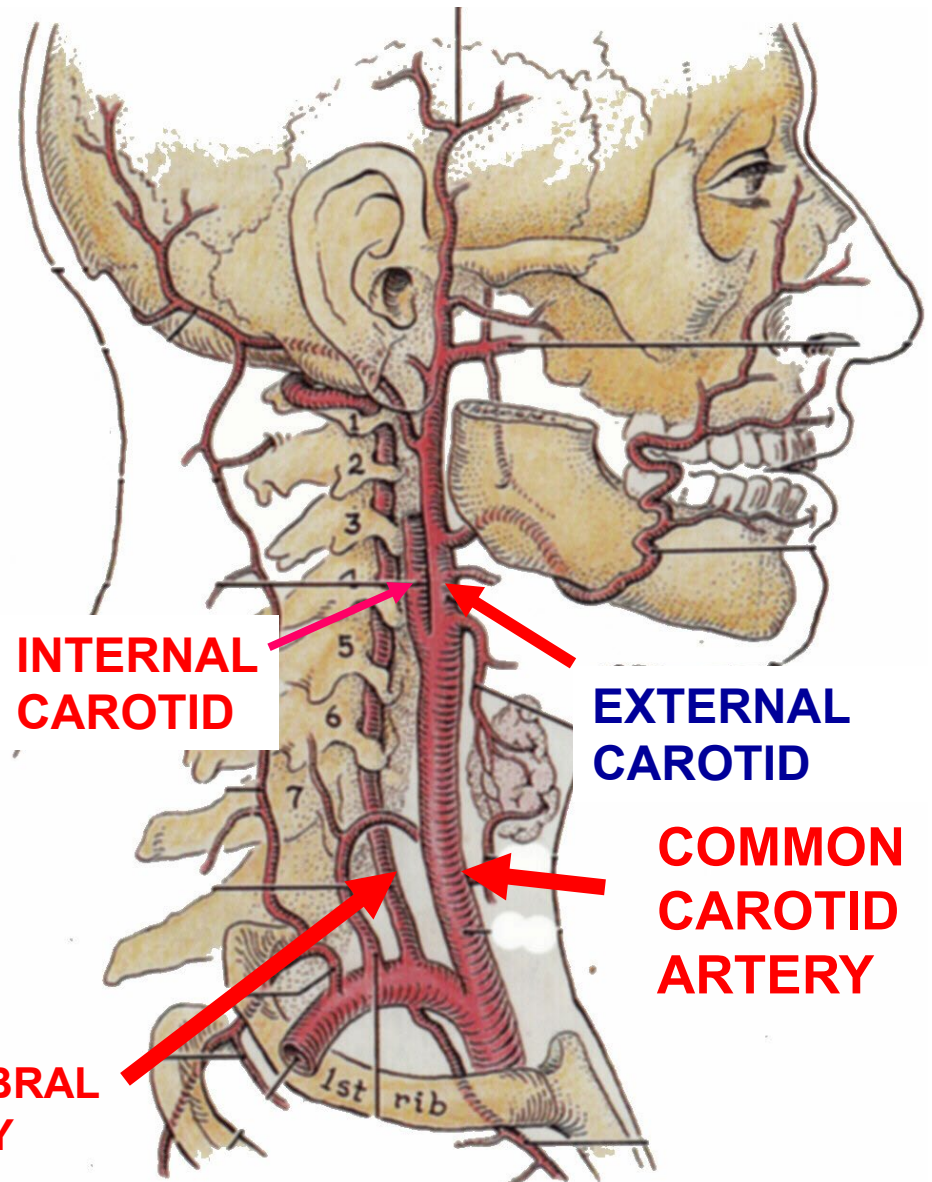
2) INTERNAL CAROTID ARTERY AND VERTEBRAL ARTERY SUPPLY BRAIN

3) EXTERNAL CAROTID ARTERY SUPPLIES FACE AND HEAD

Branches:

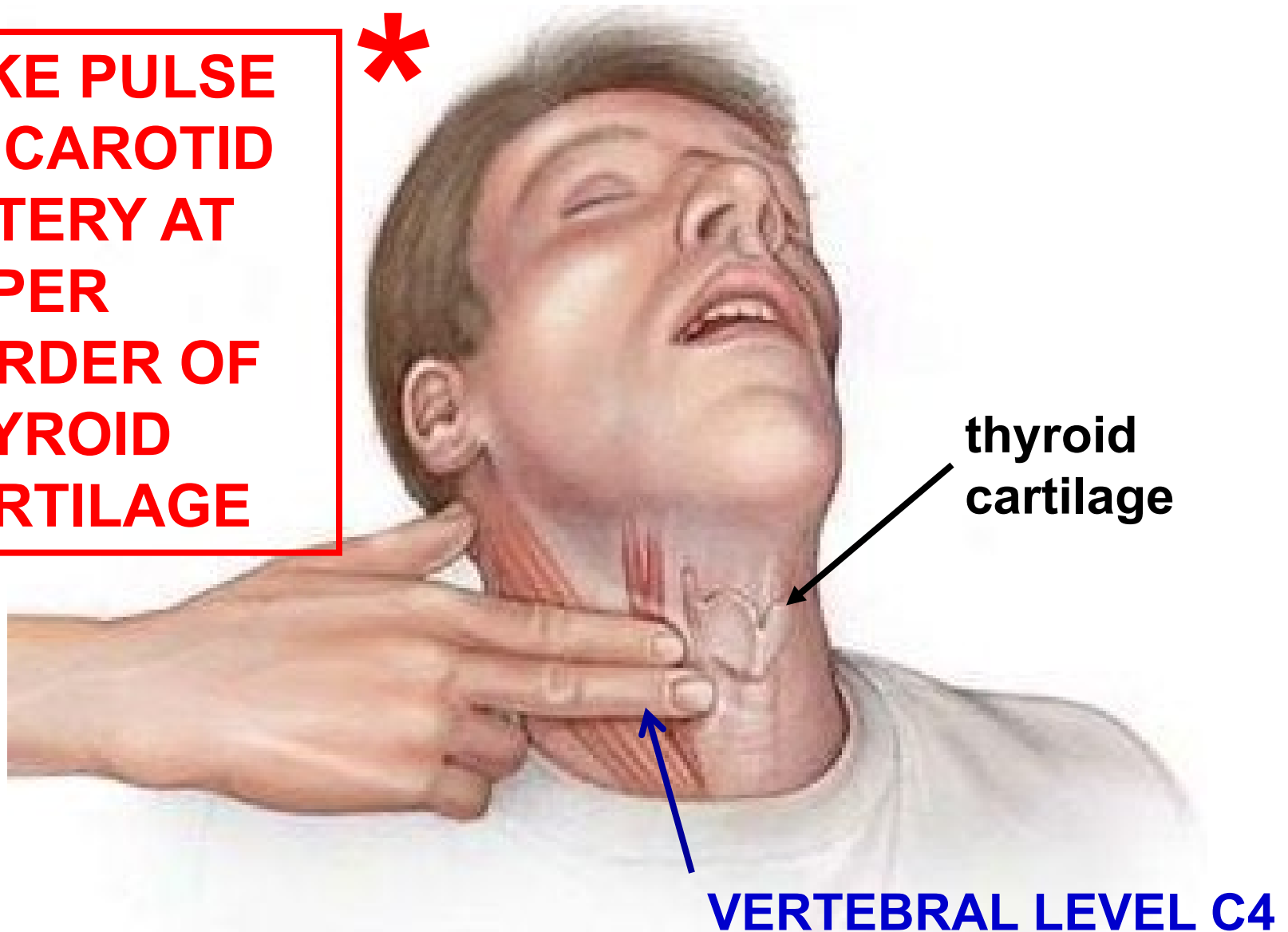
1. SUPERIOR THYROID
2. ASCENDING PHARYNGEAL
3. LINGUAL
4. FACIAL
5. OCCIPITAL
6. POSTERIOR AURICULAR
7. SUPERFICIAL TEMPORAL
8. MAXILLARY

Mnemonic - 'Some Anatomists Like Freaking Out Poor Medical Students'

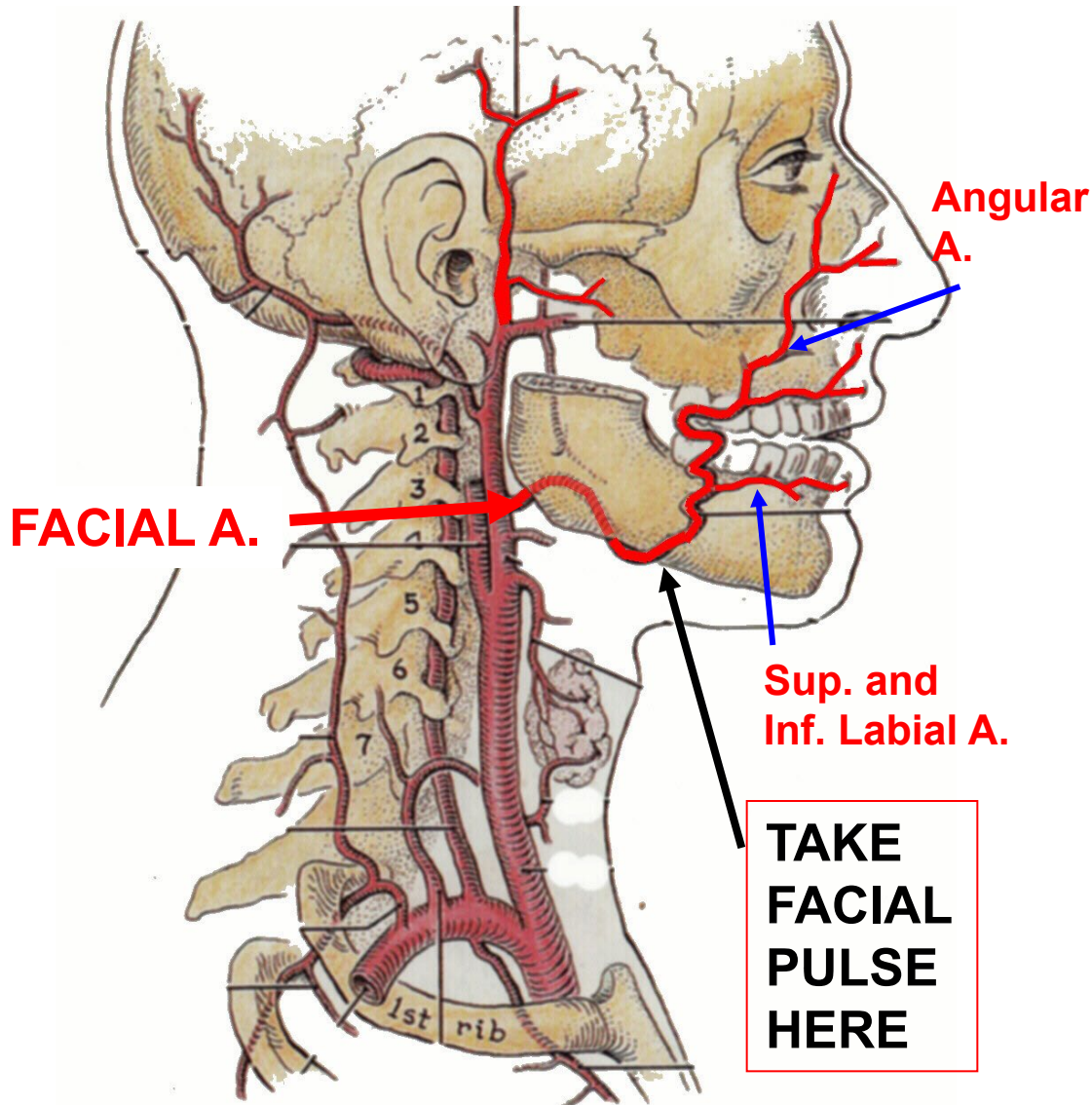


PALPATE CAROTID BIFURCATION AT UPPER BORDER OF THYROID CARTILAGE

**TAKE PULSE
OF CAROTID
ARTERY AT
UPPER
BORDER OF
THYROID
CARTILAGE**



II. ARTERIAL SUPPLY TO FACE - mainly from Facial and Superficial Temporal Arteries



a) Facial A.

- extremely winding and tortuous (skin moves)
- arises from ant. side of Ext Carotid.
- courses first medial to mandible then anterior
- site of Facial Pulse

Branches:

- 1) Sup. and Inf. Labial Arteries – upper and lower lips

Note: Anastomose with opposite side (cut lip can bleed profusely)

- 2) Angular Artery
- nose, angle (corner) of eye

ARTERIAL SUPPLY TO FACE

**TAKE
PULSE
HERE**

b) Superficial Temporal A.

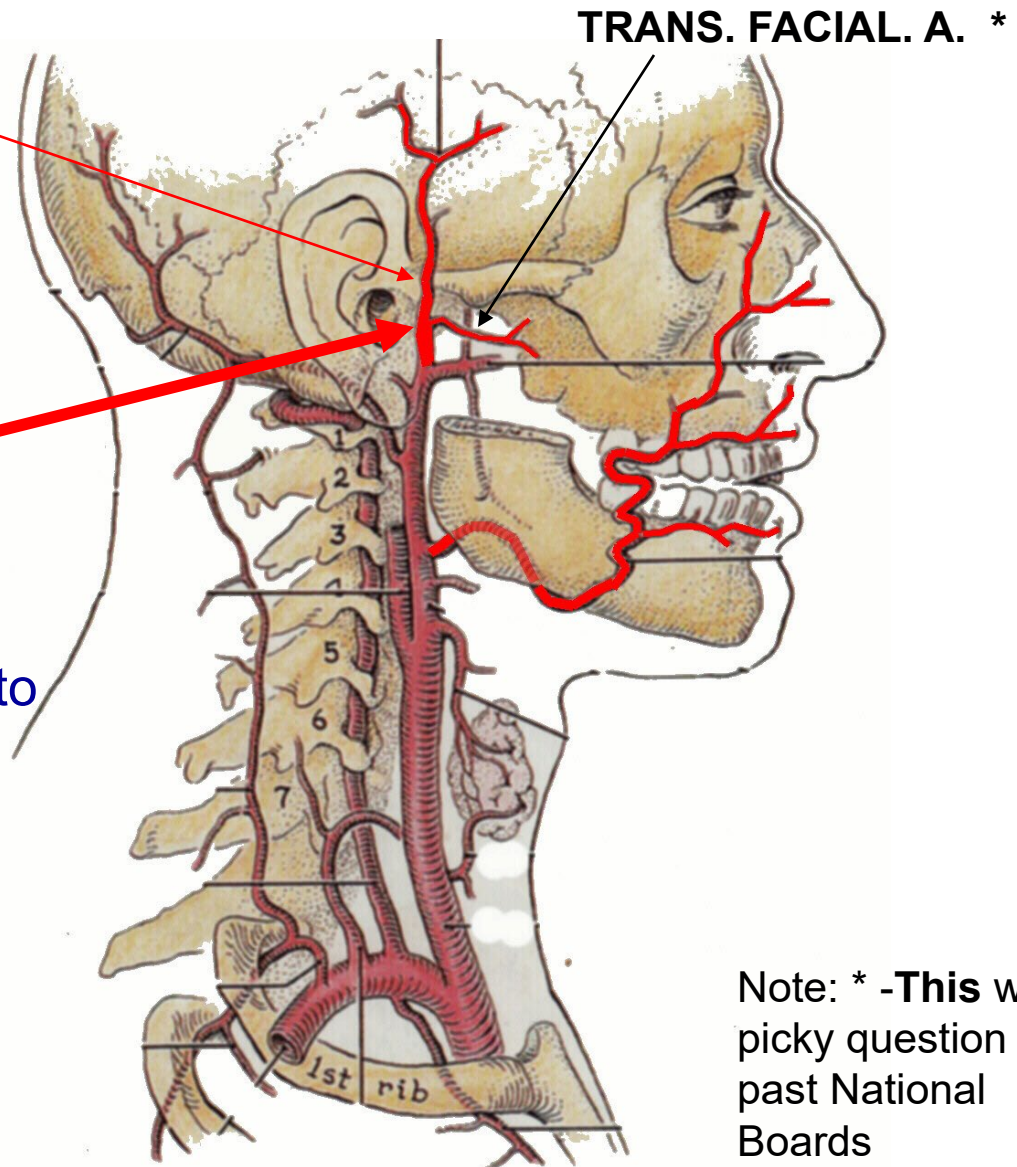
- one of terminal branches
- arises ant. to Ext.
auditory meatus (opening to
ear),

deep to parotid

- many branches to scalp

Small branches to face:

note: CONFUSING AND
INCONSEQUENTIAL - Transverse
Facial artery

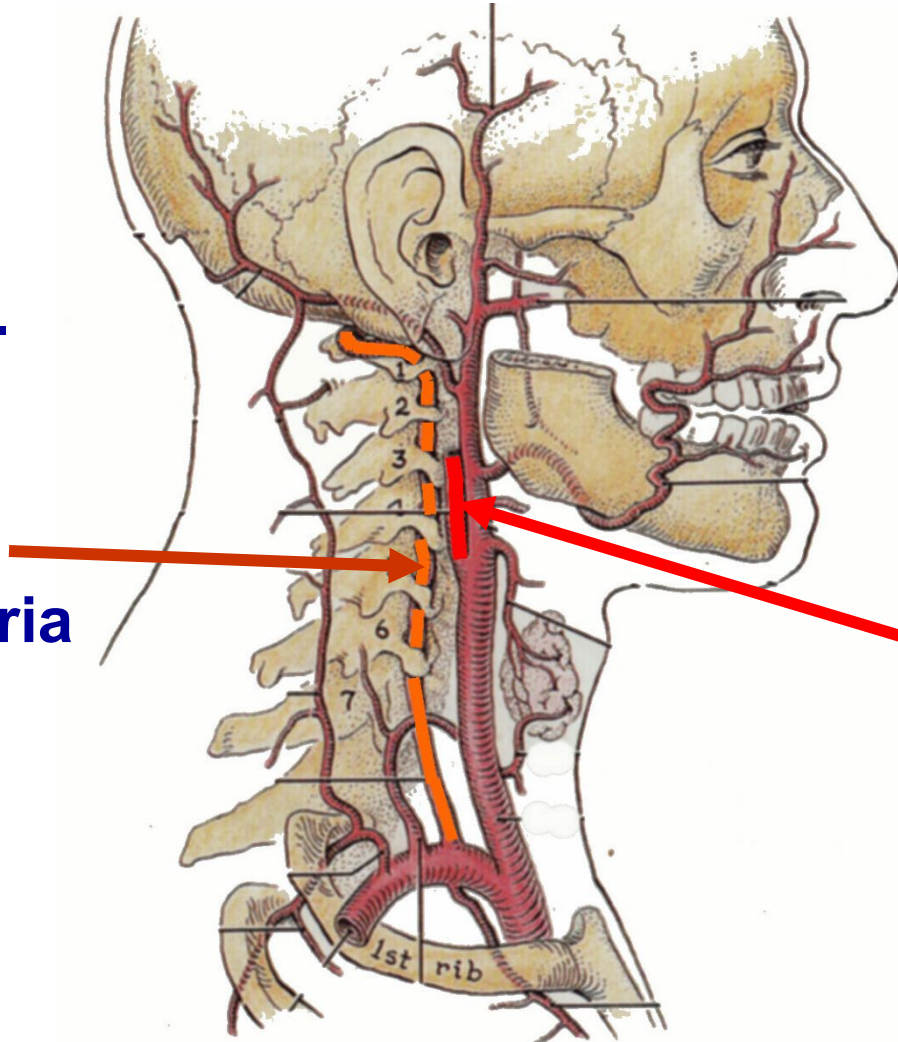


Note: * -**This** was a
picky question on
past National
Boards

OVERVIEW OF BLOOD SUPPLY TO HEAD -

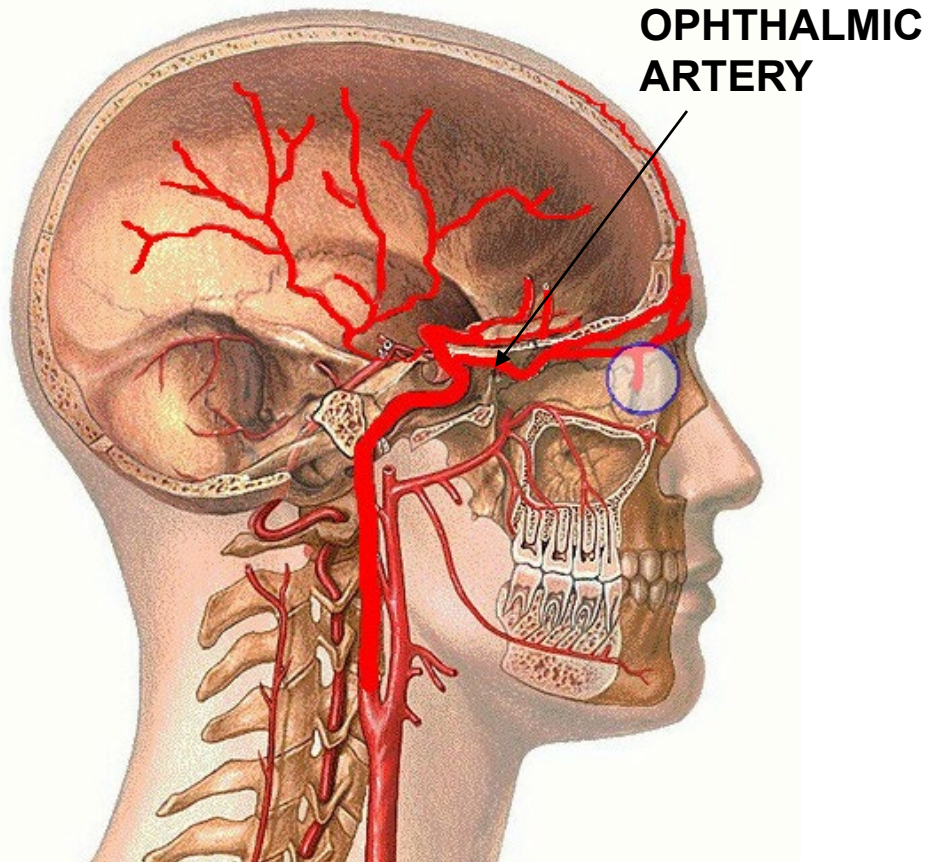
Internal Carotid supplies brain, also branches to eye, face

**Vertebral A.
Courses
Through
Foramina
Transversaria
C1-C6;
supplies
brain stem,
spinal cord**



**Int. Carotid A.
Ascends
without
Branching
into Skull (via
Carotid
Canal)**

INTERNAL CAROTID ARTERY



**Note: Carotid = Karatikos
in Greek = stupor;
Named by Galen;
Compression causes
black out**

**Enters skull without
Branching**

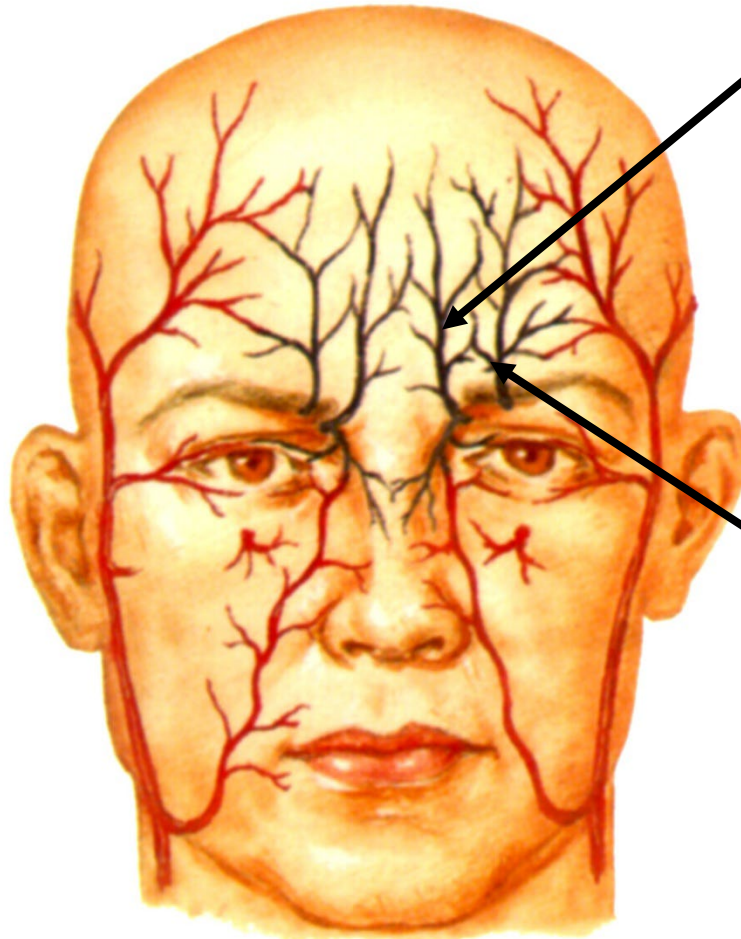
Branches to:

A. Brain

**B. Ophthalmic Artery-
Major blood supply
To eye (orbit)**

**Note: Branches of Ophthalmic artery leave orbit to supply
Face, Forehead, Nasal cavity**

2. BRANCHES OF INTERNAL CAROTID TO FACE - From Ophthalmic Artery

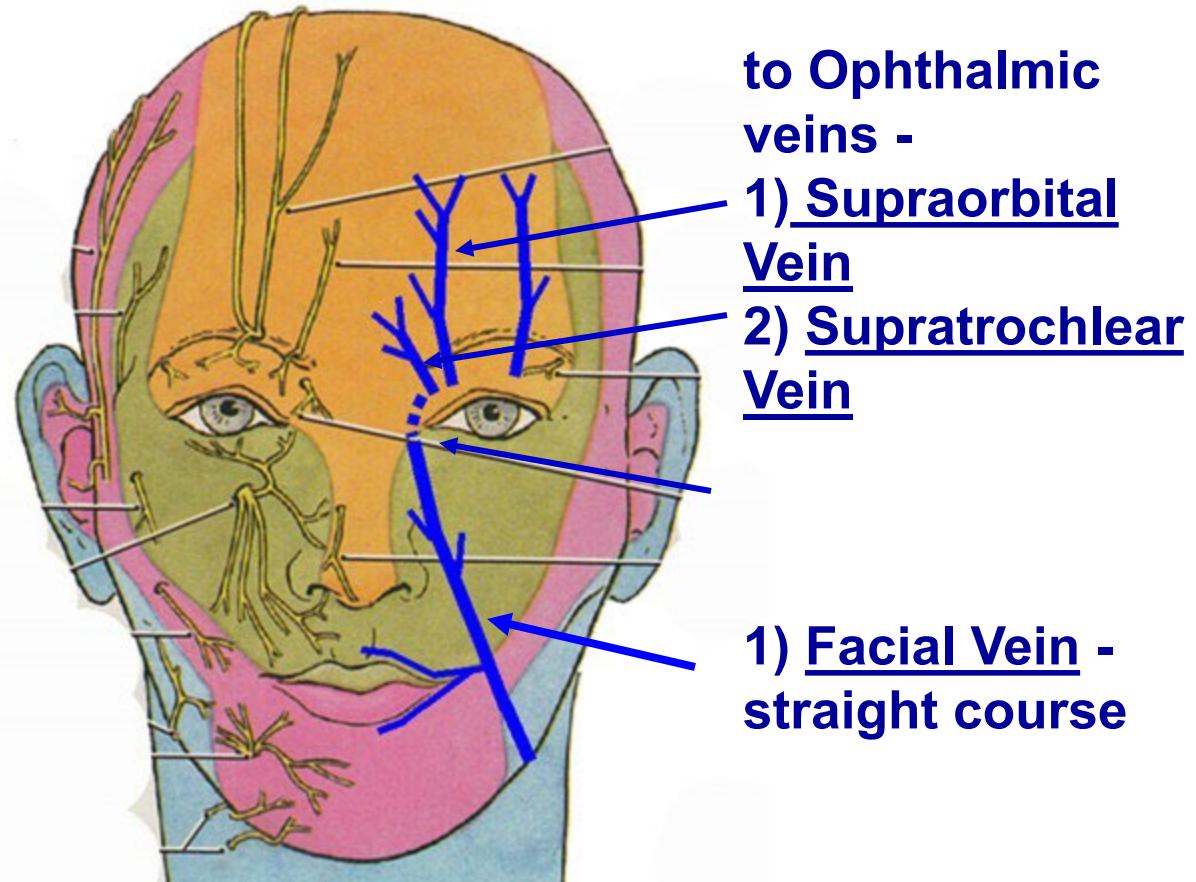


2) Supratrochlear artery-
on medial side of
Supraorbital a.
(above trochlea)

1) Supraorbital artery –
to scalp above orbit

Note: Orbit (= eye socket) is major route for nerves and blood vessels to reach face and nasal cavity

III. VENOUS DRAINAGE - branches follow arteries

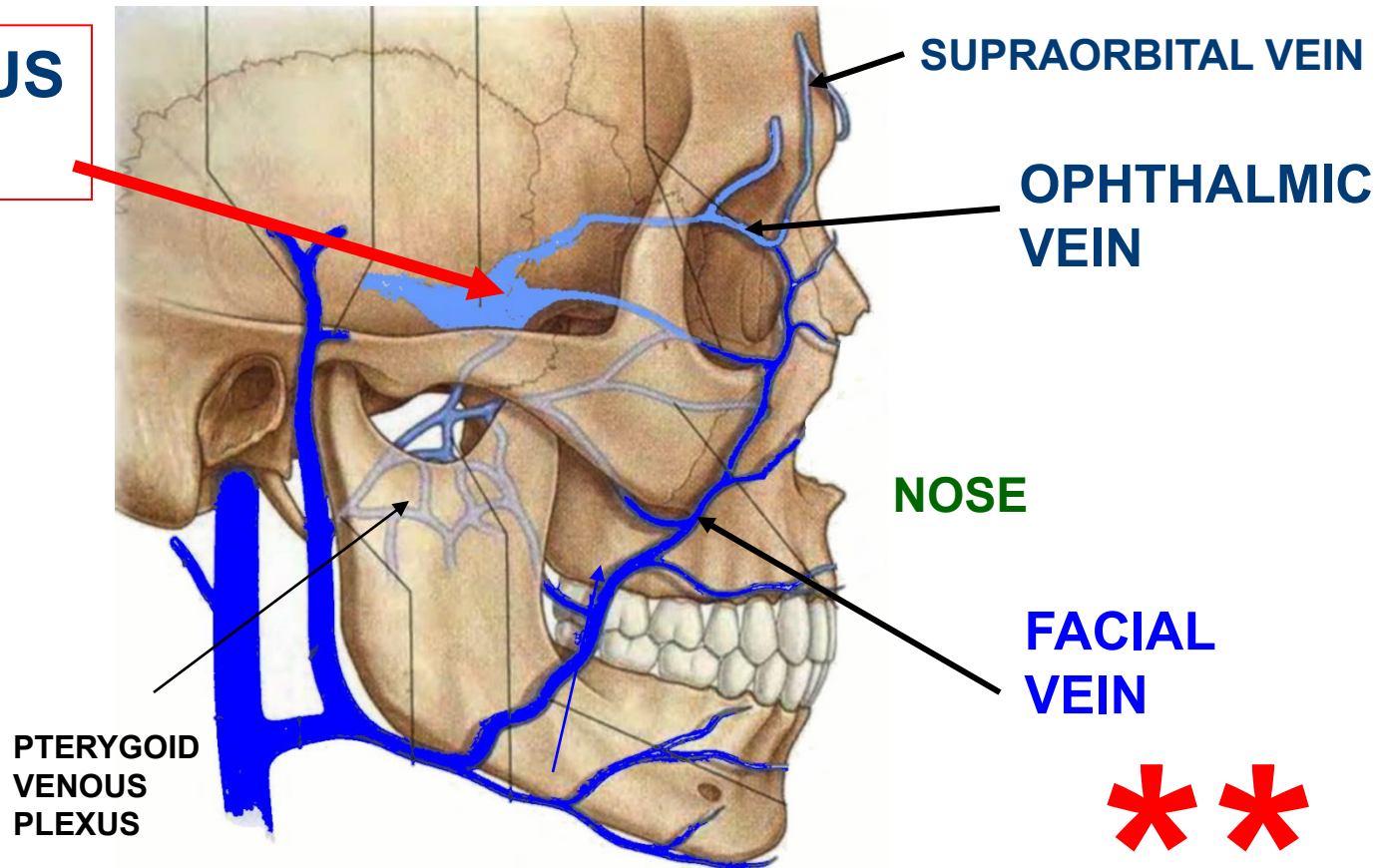


- NOTE: Veins of Face have no (OR FEW AND VARIABLE) valves; drain to neck and into skull;
Extensive anastomoses between branches of Facial AND Ophthalmic Veins

SPREAD OF INFECTION FROM FACE TO BRAIN

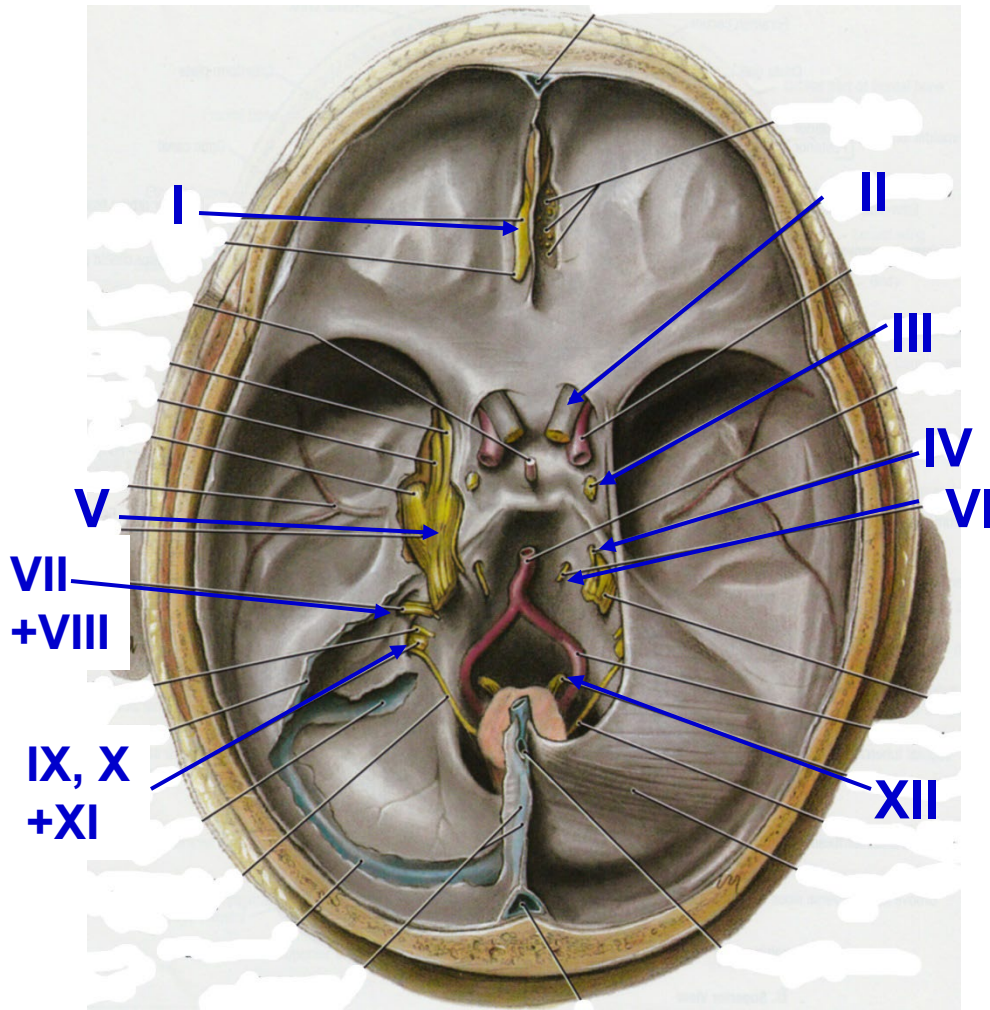
CAVERNOUS SINUS

Anastomoses of Facial and Ophthalmic Veins
- Ophthalmic veins drain to cavernous sinus (venous sinus inside skull)



- **Prolonged infections** spread via veins (pressure low, no valves)
- Pass through orbit to Cavernous Sinus - **CAVERNOUS SINUS THROMBOSIS**; infections lateral to nose particularly dangerous
- **Clinical sign: 'Blurred' vision (actually DIPLOPIA)** (cranial nerves to eye muscles pass through Cavernous sinus)

LEARN NAMES AND NUMBERS OF CRANIAL NERVES



- I. OLFACTORY - sense of smell
- II. OPTIC - vision
- III. OCULOMOTOR - eye movement
- IV. TROCHLEAR - eye movement
- V. TRIGEMINAL - touch, general sensation to skin, oral cavity, nasal cavity + more
- VI. ABDUCENS - eye movement
- VII. FACIAL - muscles of facial expression + lots more
- VIII. VESTIBULO-COCHLEAR - hearing and balance
- IX. GLOSSOPHARYNGEAL - sensory to pharynx + more
- X. VAGUS - larynx, pharynx + rest of body
- XI. ACCESSORY - sternocleidomastoid, trapezius
- XII. HYPOGLOSSAL - muscles of tongue

IV. SENSORY INNERVATION - TRIGEMINAL NERVE - TO SKIN OF HEAD – 3 DIVISIONS

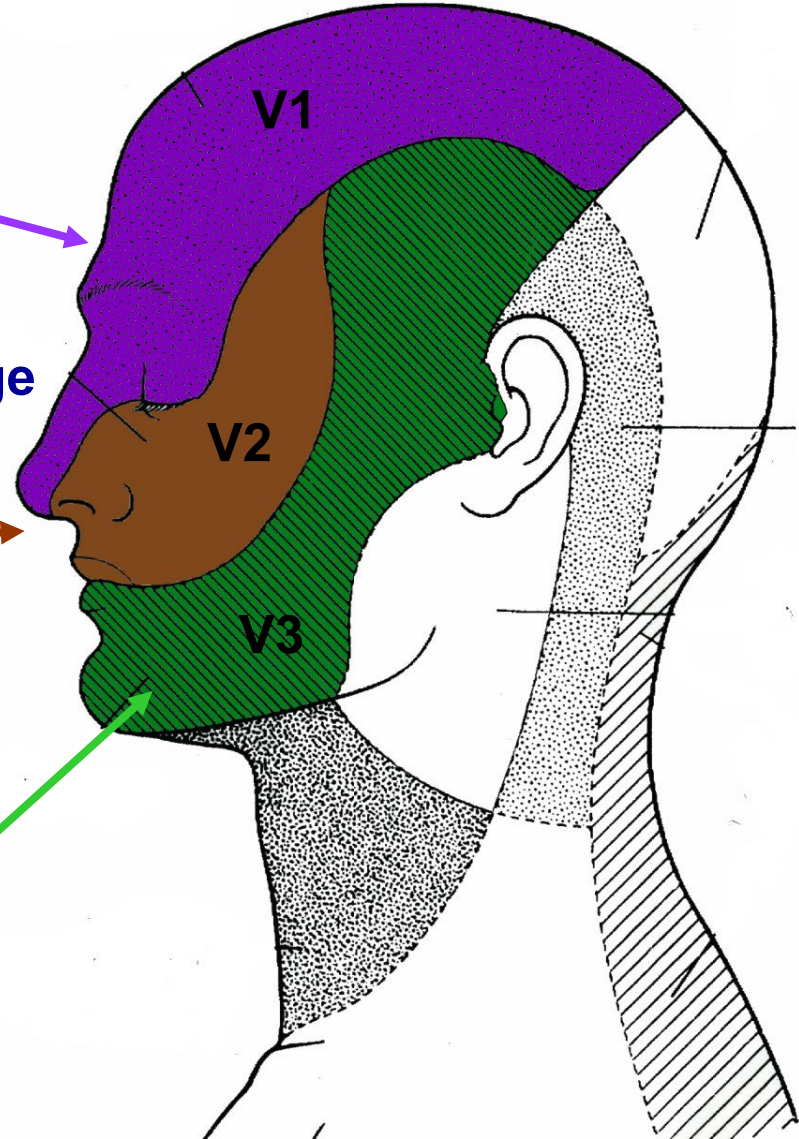
**V1 –
OPHTHALMIC
DIVISION**

**V2 –
MAXILLARY
DIVISION**

**V3 –
MANDIBULAR
DIVISION**

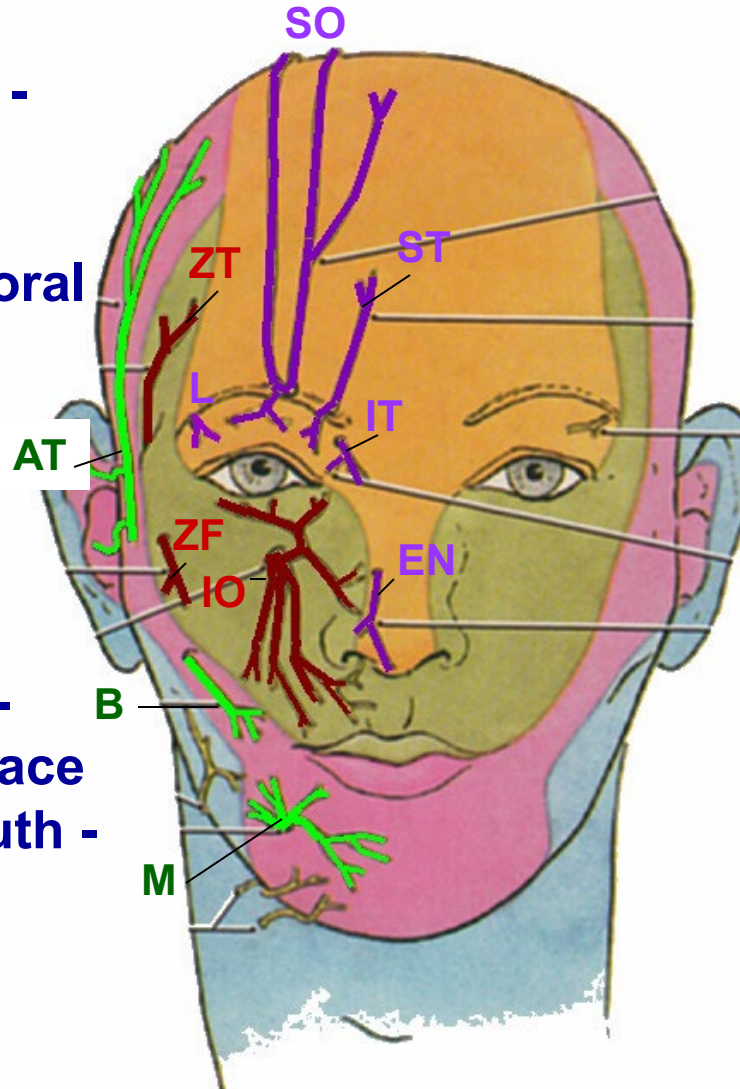
Boundary-
Lateral edge
of eye

Boundary
Lateral
edge
of mouth



SENSORY SUPPLY - BRANCHES OF TRIGEMINAL NERVE TO FACE

V2 – MAXILLARY -
to skin of cheek
below orbit -
Zygomaticotemporal
Zygomaticofacial
Infraorbital



V3- MANDIBULAR -
to skin of jaw and face
below angle of mouth -
Auriculotemporal
Buccal
Mental

NOTE: These are SOME branches of V (to face), not ALL branches of V

V1 – OPHTHALMIC -
to skin above orbit -
Lacrimal

Supraorbital
Supratrochlear
Infratrochlear
External Nasal Nerve

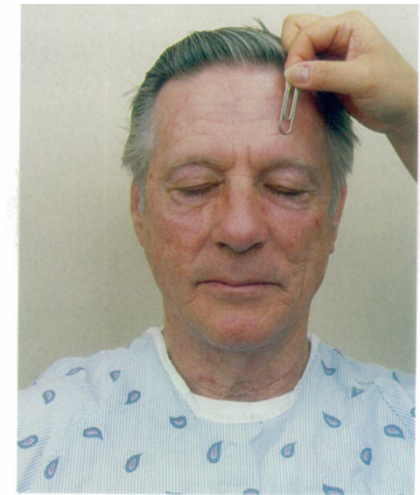


FIGURE 21-13
Examination of the trigeminal cranial nerve

**CLINICAL TEST OF V:
SUPRAORBITAL N.**

REFERENCE HANDOUT: TRIGEMINAL NERVE BRANCHES (NOT INCLUDING HITCHHIKING PATHWAYS OF V1, IX)

**ALL
BRANCHES
OF
TRIGEMINAL
NERVE
ARE LISTED
IN
HANDOUT**

**DO NOT
MEMORIZE
NOW BUT USE
AS
REFERENCE –
SEE LATER**

V1 Ophthalmic - Somatic Sensory only (GSA) - through Superior Orbital Fissure to Orbit

Nerve	Branches	Innervates
1. Frontal Nerve	a. Supraorbital Nerve	Scalp forehead, upper eyelid
	b. Supratrochlear Nerve	Scalp forehead, upper eyelid
2. Lacrimal Nerve		Upper eyelid
3. Nasociliary Nerve	a. Long Ciliary Nerve	Cornea of eye
	b. Ant. and Post. Ethmoidal Nerves	Nasal cavity, ethmoid sinus, tip of nose
	c. Infratrochlear Nerve	Upper eyelid, nose

V2 Maxillary - Somatic Sensory (GSA) only - through Foramen Rotundum to Pterygopalatine Fossa

Nerve	Branches	Innervates
1. Meningeal branches		Dura of mid. Cranial fossa
2. Ganglionic branches	a. Greater Palatine Nerve	Hard Palate
	b. Lesser Palatine Nerve	Soft Palate
	c. Nasopalatine Nerve	Nasal Cavity, Hard Palate
	d. Nasal branches	Nasal Cavity
3. Post. Sup. Alveolar Nerve		Maxillary teeth
4. Infraorbital nerve	a. Ant. Sup. Alveolar Nerve	Maxillary teeth
	b. Mid. Sup. Alveolar Nerve	Maxillary teeth
5. Zygomatic nerve	a. Zygomaticofacial Nerve	Skin of cheek
	b. Zygomaticotemporal Nerve	Skin of temporal region

V3 Mandibular - Somatic Sensory (GSA) and Branchiomotor (SVE) - Foramen Ovale to Infratemporal Fossa

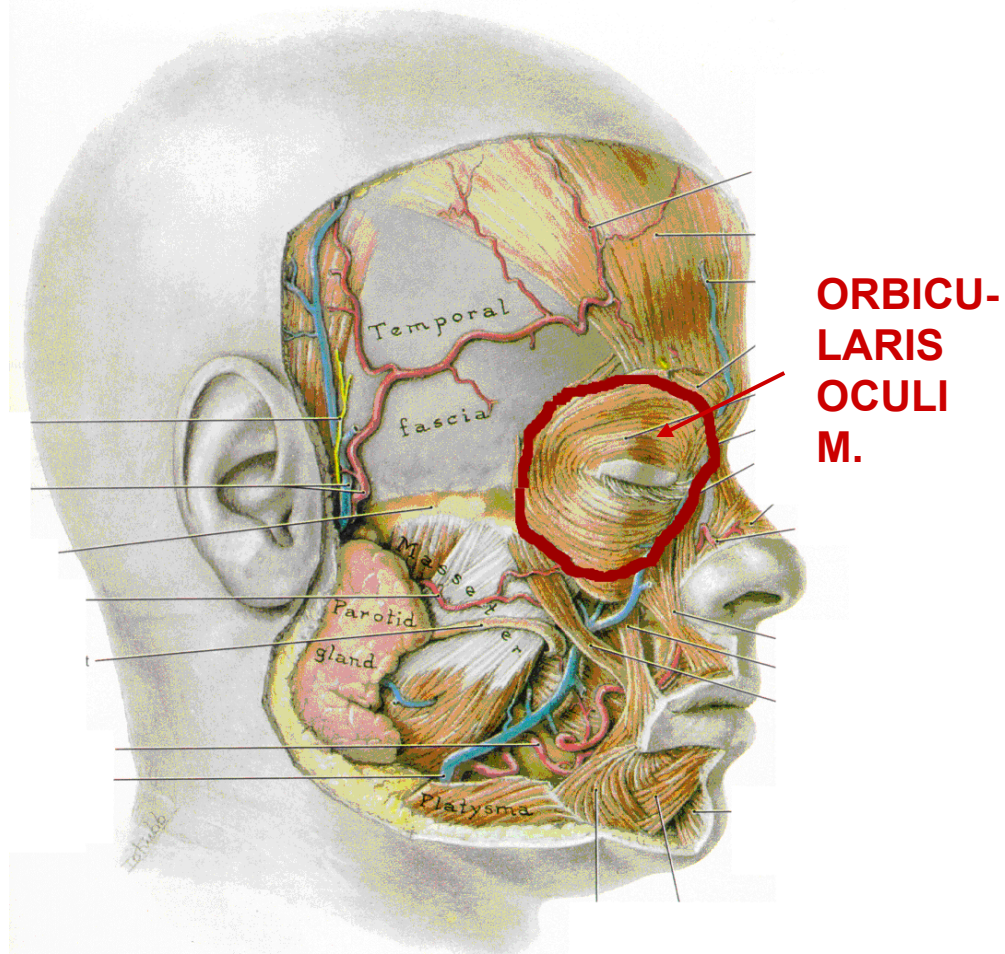
Nerve	Branches	Innervates
1. Nervous spinosus		Sensory to Dura of mid Cranial fossa
2. Motor branches		Motor to Med. Pterygoid, Tens. Tympani, Tensor Palati
3. Anterior division	a. Nerve to Lateral Pterygoid	Motor to Lateral Pterygoid
	b. Masseteric Nerve	Motor to Masseter
	c. Deep Temporal Nerve	Motor to Temporals
	d. Buccal Nerve	Sensory to Cheek
4. Posterior Division	a. Auriculotemporal Nerve	Sensory to external auditory meatus, tympanic membrane, TMJ, lateral scalp
	b. Lingual Nerve	Sensory (touch) ant. 2/3 tongue
	c. Inferior Alveolar Nerve	Sensory to Mandibular teeth
	i. Nerve to Mylohyoid	Motor to Mylohyoid, ant. Digastric
	ii. Mental Nerve	Sensory to Chin, Lower lip

V. MUSCLES OF FACIAL EXPRESSION

- move skin of face, close eyes, open/close mouth
- convey emotions by gestures (ex. sneering, contempt) - most origin – bones; insert - skin
- many named for action in Latin/Greek
- movements elicited in test for Facial Nerve function (CN VII)

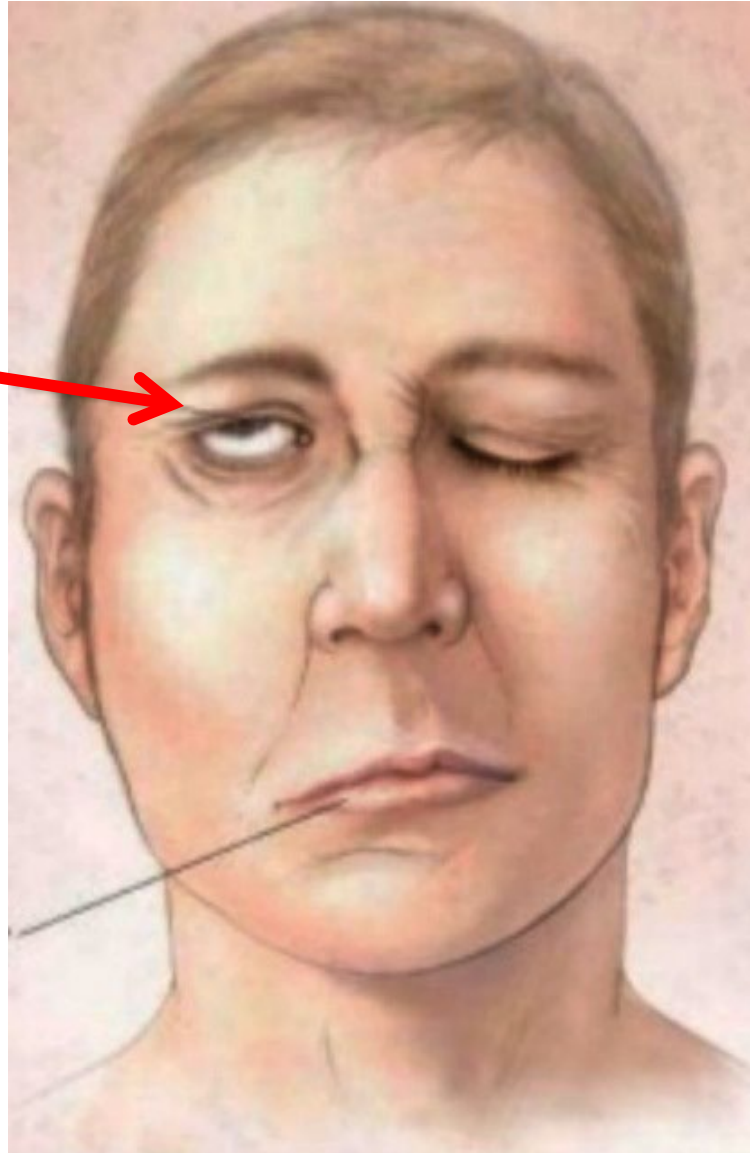
1. Orbicularis Oculi - close eye

- Palpebral part – in eyelid - Close eyelids
- Orbital part – on face - Buries eyelids, Ex. sandstorm



PARALYSIS OF ORBICULARIS OCULI

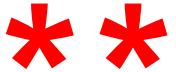
UNABLE TO
CLOSE EYE
DUE TO
PARALYSIS
OF
ORBICULARIS
OCULI
MUSCLE



NOTE:

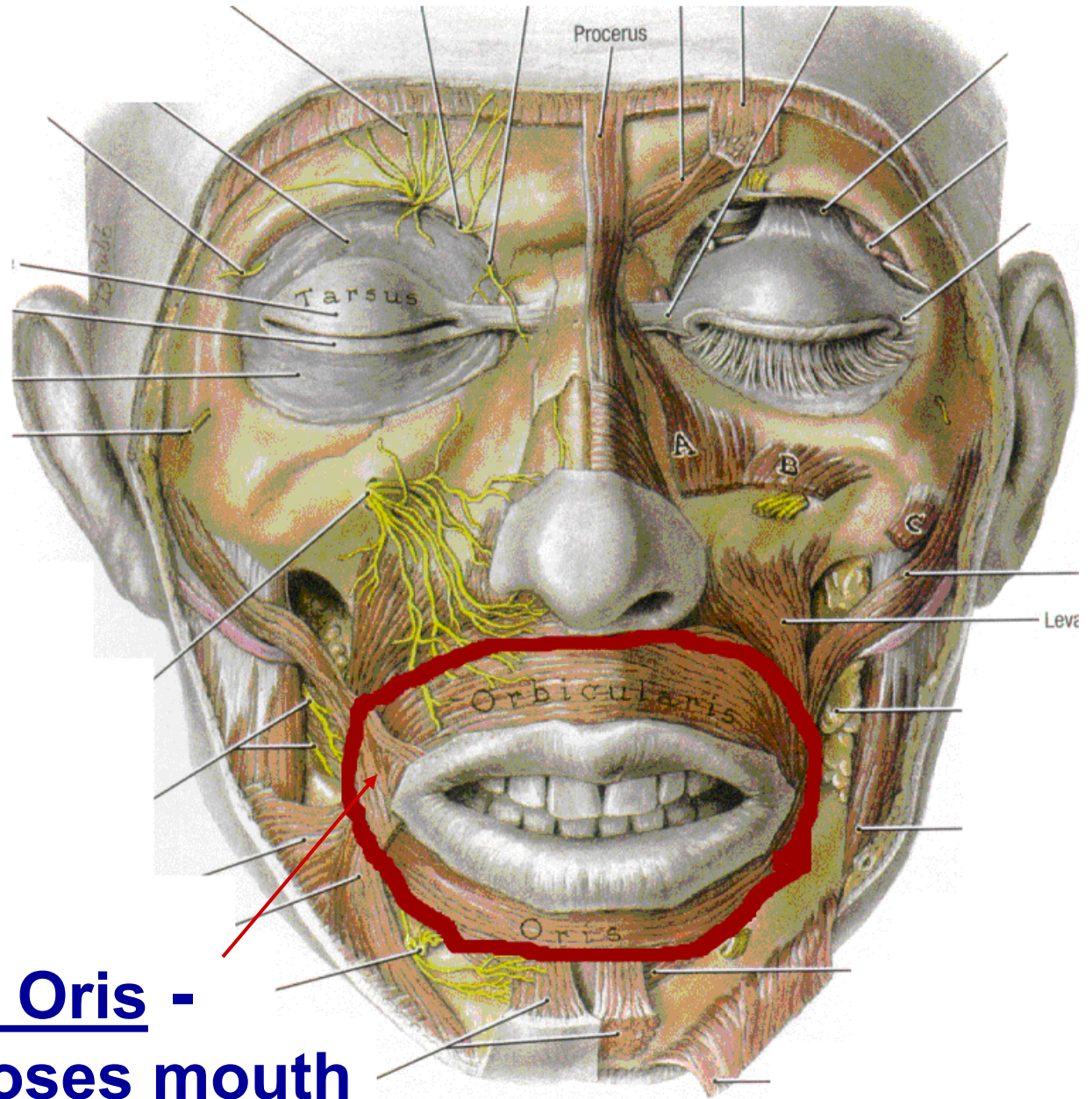
- 1) CLOSE EYELIDS
= CRANIAL NERVE VII (FACIAL N.)
- 2) OPEN EYELIDS
- CRANIAL NERVE III (OCULOMOTOR)
+ SYMPATHETICS

CLINICAL



FACIAL PARALYSIS (as in Bell's Palsy) can paralyze ORBICULARIS OCULI MUSCLE

- patient is unable to close eye
- can damage cornea of eye
- in newborns, can sew eyelid shut to prevent corneal damage



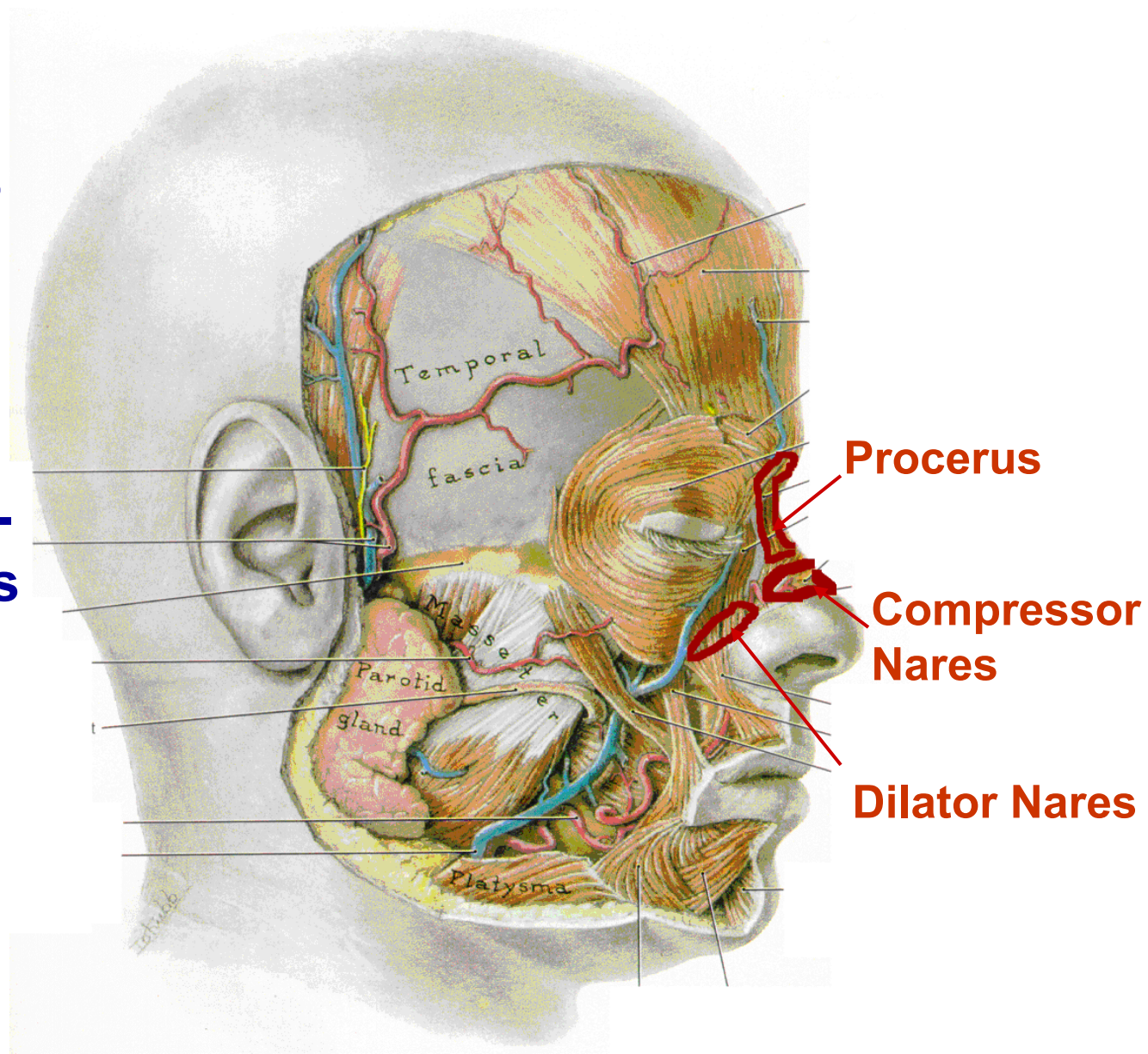
**2. Orbicularis Oris -
Surrounds/closes mouth**

3. MUSCLES OF NOSE

a. Compressor nares - lateral to bridge of nose compresses nasal cart.

b. Dilator nares - lateral to nostrils - dilates

c. Procerus - wrinkles skin of nose



**FACIAL
PARALYSIS**



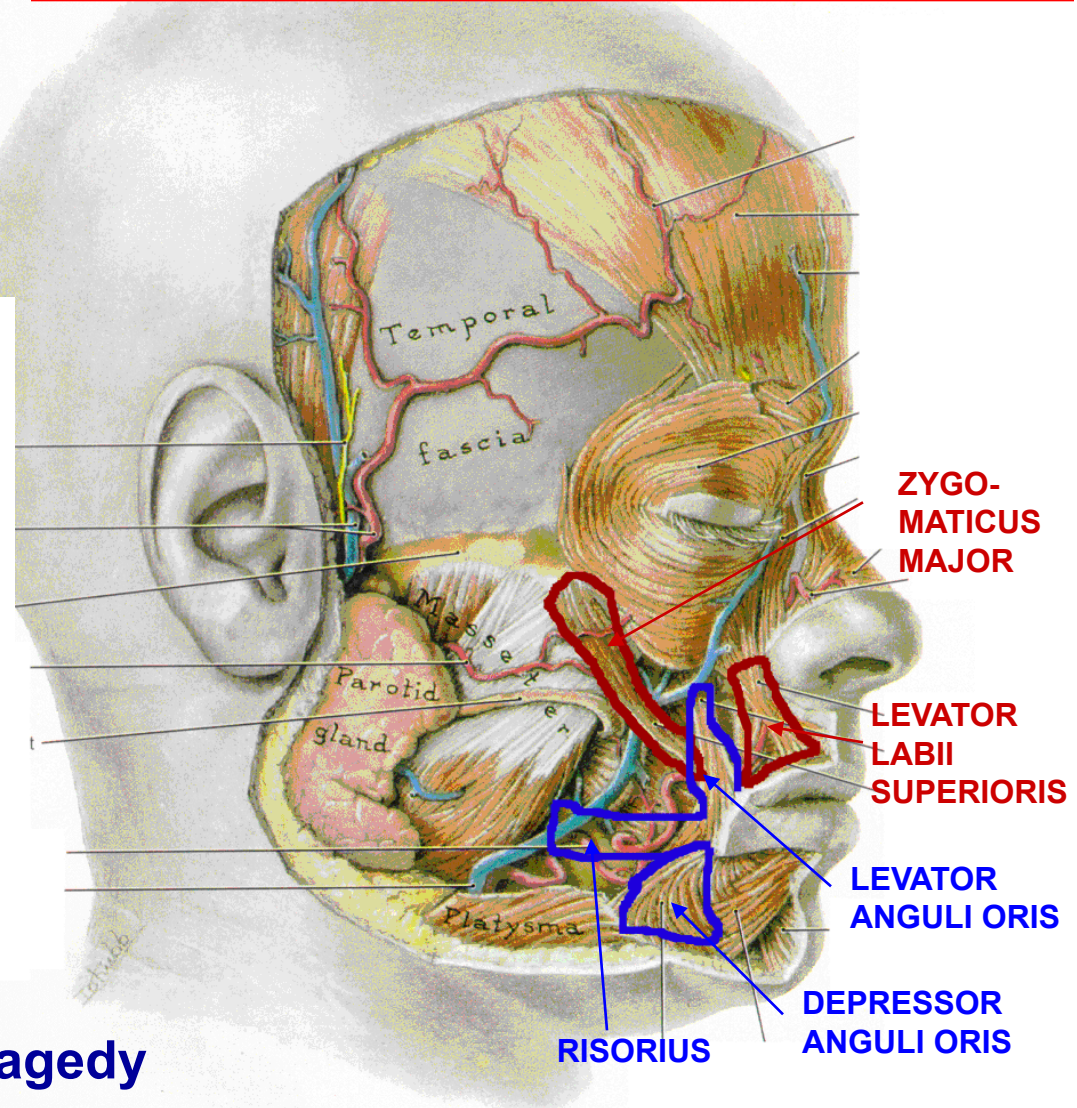
**PARALYSIS OF MUSCLES OF UPPER LIP
PRODUCES DROOPING OF ANGLE OF MOUTH,
LOSS OF NASO-LABIAL FOLD**

4. MUSCLES OF UPPER LIP-

- a) Levator Labii Superioris - lifts upper lip
- b) Zygomaticus major and minor - raise and pull upper lip laterally

5. MUSCLES AT ANGLE OF MOUTH

- a) Levator Anguli Oris - Raise corner of mouth
- b) Risorius - smiling
- c) Depressor Anguli Oris - tragedy



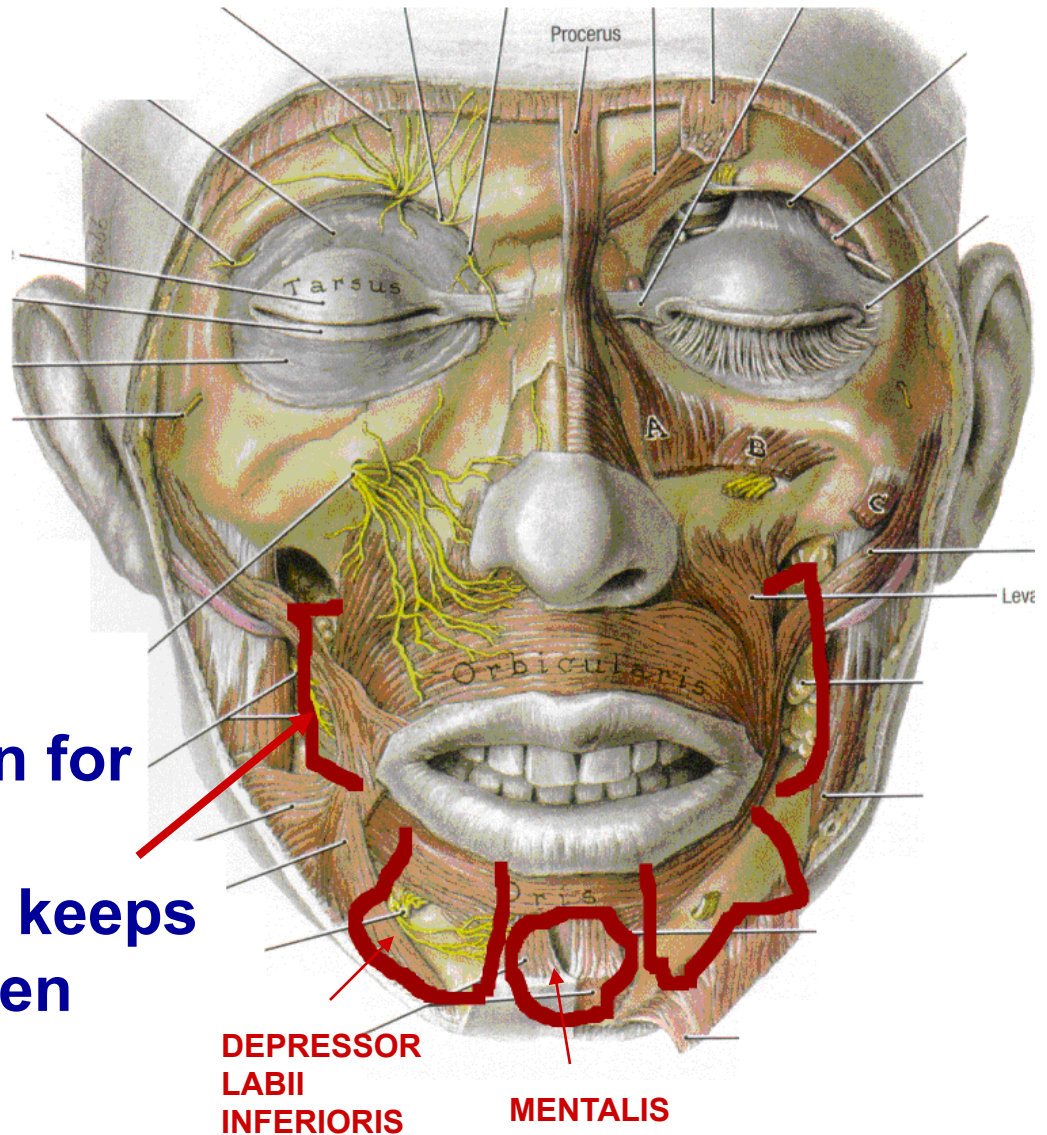
6. MUSCLES OF LOWER LIP AND CHIN-

a) Depressor Labii Inferioris -

depresses low lip

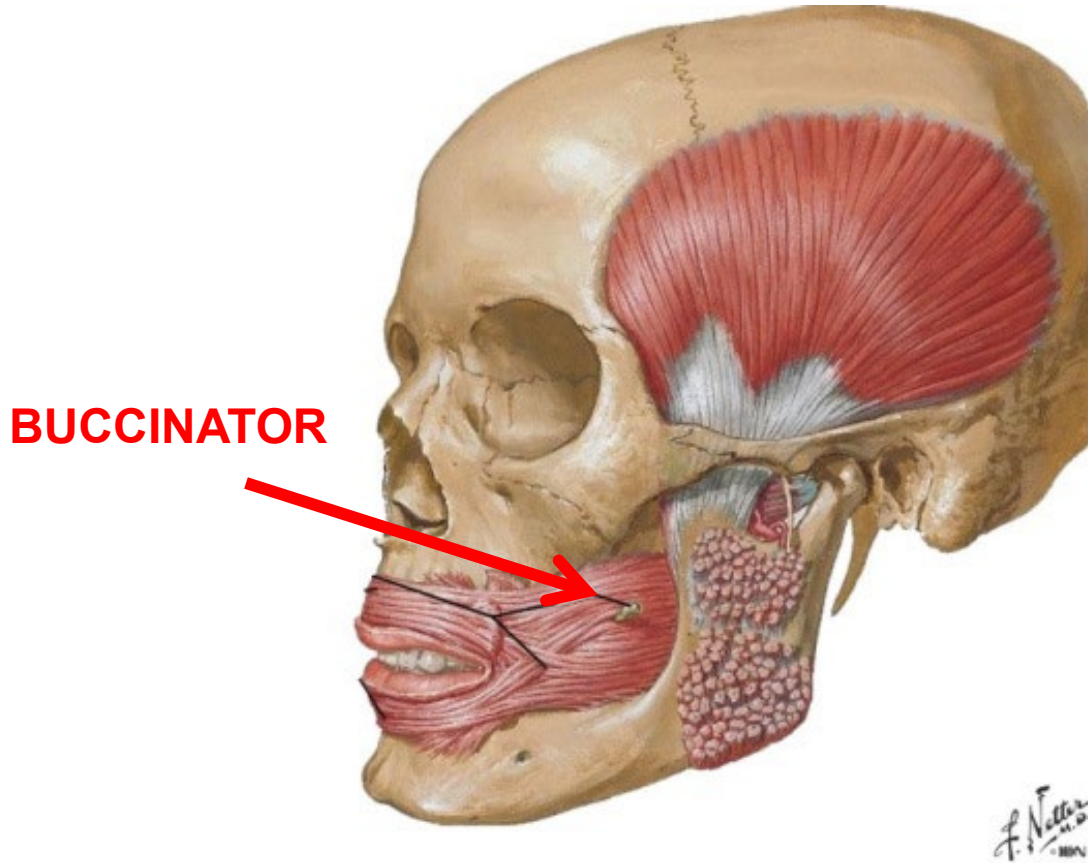
b) Mentalis -
wrinkles skin of chin

7. BUCCINATOR – Latin for trumpet player
- compresses mouth & keeps food between teeth when chewing



PARALYSIS OF BUCCINATOR MUSCLE

CLINICAL * *



FACIAL PARALYSIS
can paralyze
BUCCINATOR

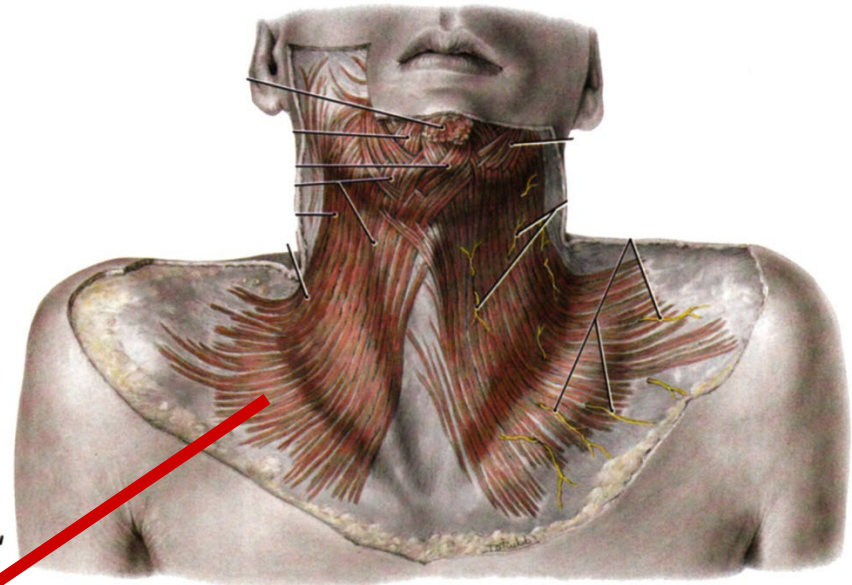
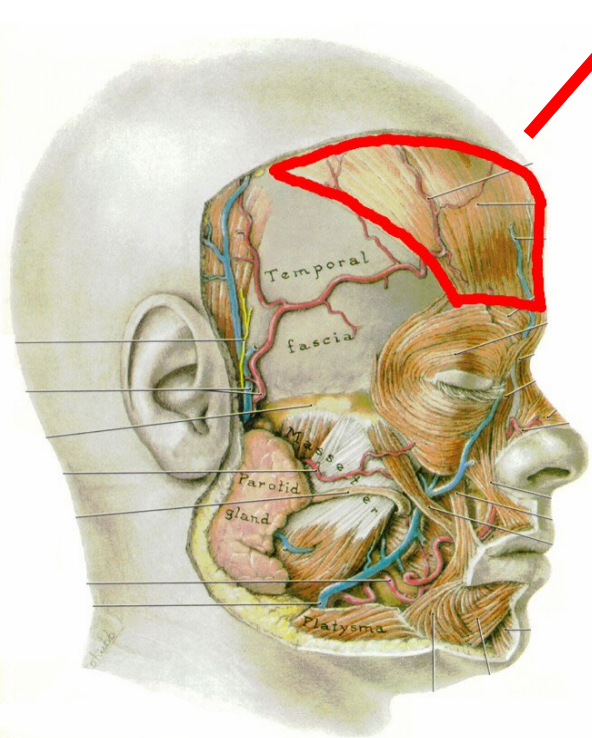
- patient is unable to
hold food between
teeth

BOARD QUESTION

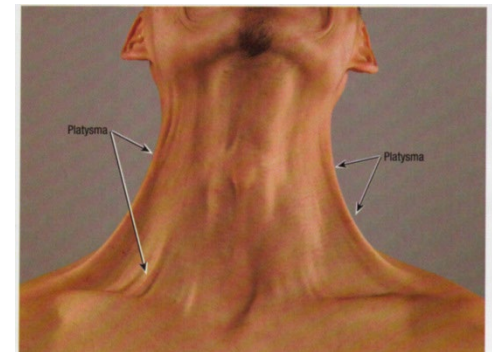
- **DIFFICULTY IN**
CHEWING FOOD

BUCCINATOR FORMS WALL OF
MOUTH - PARALYZE UNABLE TO
HOLD FOOD BETWEEN TEETH

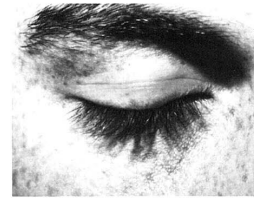
8. FRONTALIS - muscle in scalp attached to Epicranial Aponeurosis; raises eyebrows (used in clinical test of Facial nerve)



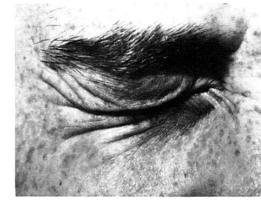
9. PLATYSMA - extends from mandible to fascia over Pectoralis Major; tenses, moves skin of neck



PRACTICE USING FACIAL MUSCLES SELECTIVELY IN FRONT OF MIRROR



Palpebral Part



Orbital Part

Orbicularis Oculi

**Sneering –
Procerus**



Procerus



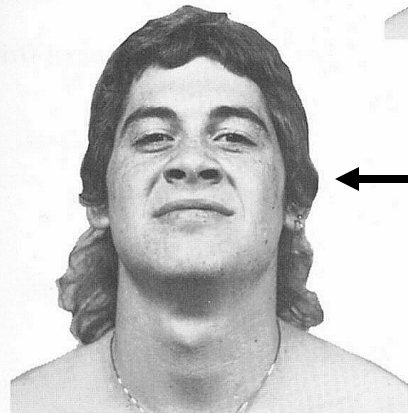
Frontalis



Corrugator Supercilii



Procerus



Nasalis



**Contempt –
Dilator Naris**



Nasalis

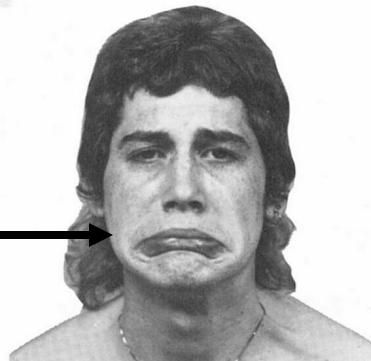


Risorius



Depressor Anguli Oris

**Grading Policy -
Depressor Anguli
Oris**



Depressor Anguli Oris



Orbicularis Oris



Zygomaticus Major



Mentalis

7-15B MUSCLES OF EXPRESSION IN ACTION

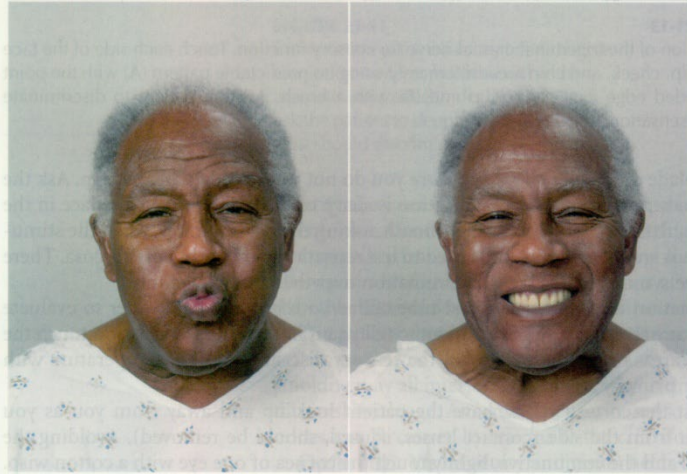
CLINICAL TEST FOR FACIAL NERVE FUNCTION

**WRINKLE
FOREHEAD BY
RAISING
EYEBROWS:
FRONTALIS**



**SMILE:
RISORIIUS**

**PURSE LIPS:
ORBICULARIS
ORIS**



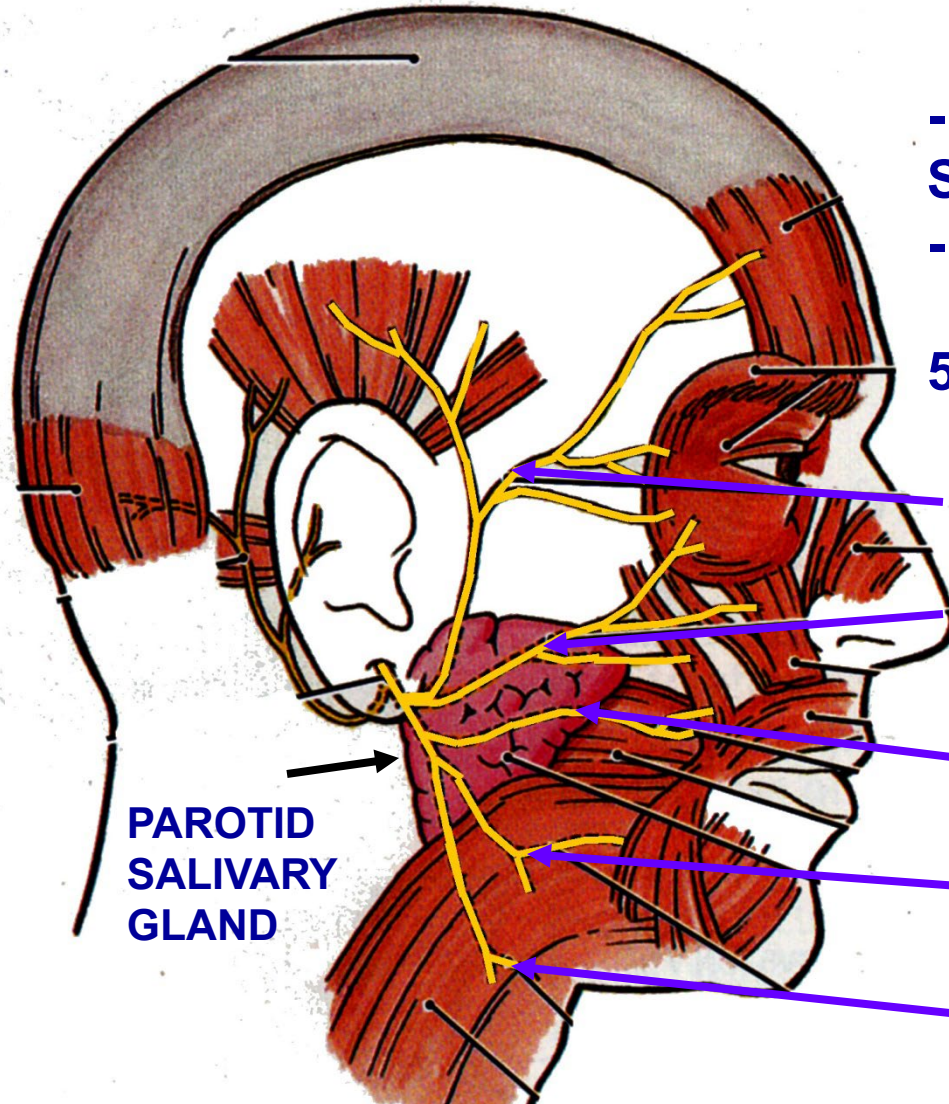
**SHOW TEETH:
LEVATOR LABII
SUPERIORIS,
ZYGOMATICUS
MAJOR, ETC.**

DR. PAUL FERGUSON: CRANIAL NERVE EXAM

- How to test:
 - First look for asymmetry before moving on to a laundry list of components:
 1. Squint eyes shut against resistance
 2. Raise eyebrows / wrinkle forehead
 3. Puff out cheeks
 4. Smile showing teeth
 5. Frown
 6. Purse lips



VI. MOTOR INNERVATION TO MUSCLES OF FACIAL EXPRESSION - FACIAL NERVE (CRANIAL NERVE VII)



- leaves skull via Stylomastoid foramen
- divides in parotid gland into

5 terminal branches

1. TEMPORAL

2. ZYGOMATIC

3. BUCCAL

4. MANDIBULAR

5. CERVICAL

PAROTID SALIVARY GLAND

Note: Buccal Br. VII = Motor; Buccal Br. V = Sensory

VII. DEVELOPMENT OF FACE

Facial Primordia (5) form in fourth week surrounding stomodeum (= primitive mouth)

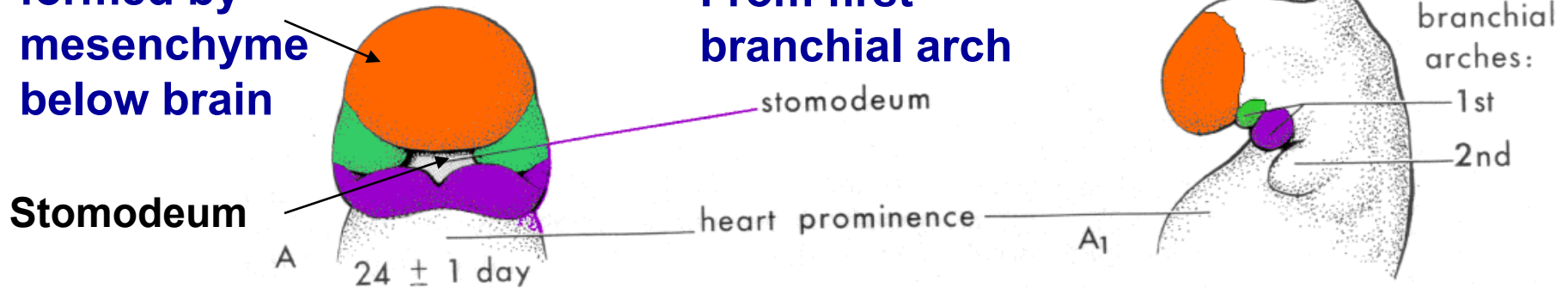
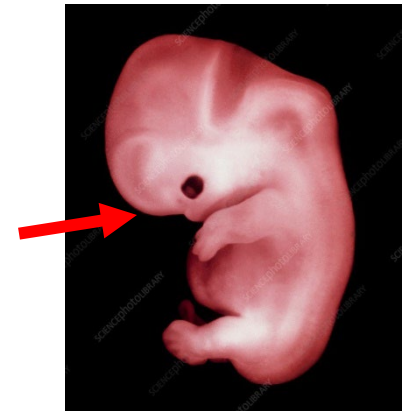
Frontonasal Process (1) -
formed by mesenchyme below brain

Maxillary Process(2)

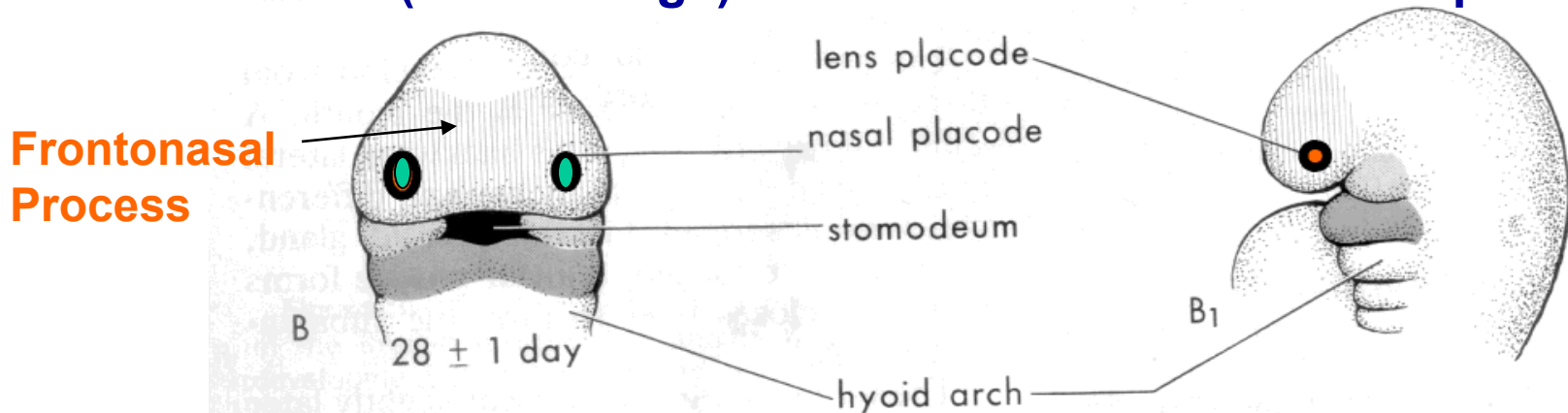
Mandibular Process (2)
From first branchial arch

HUMAN EMBRYO

VIEW OF HEAD OF EMBRYO

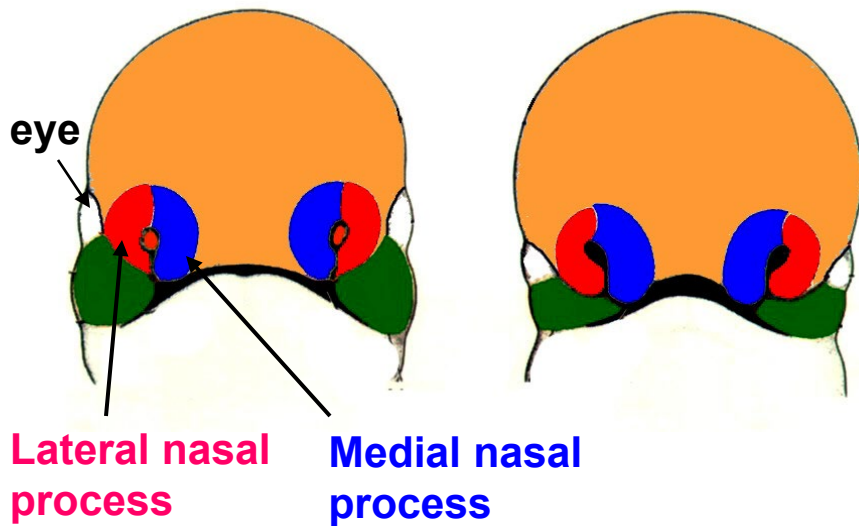


1. Nasal Placodes (Thickenings) form on side of FrontoNasal process

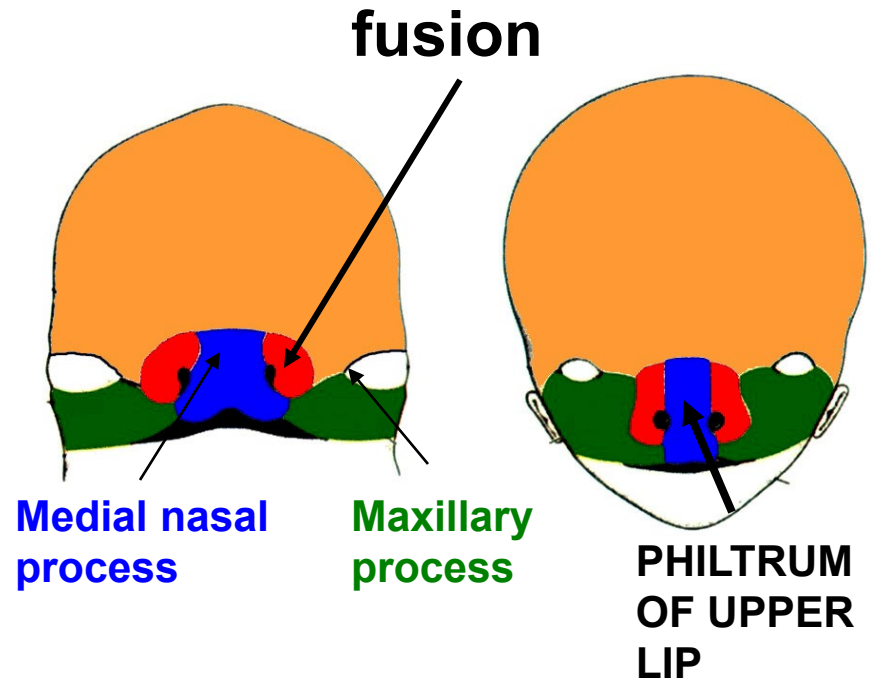


DEVELOPMENT OF FACE

2. Medial and Lateral Nasal Processes - form at margins of nasal placodes



3. Medial nasal process and Maxillary Process - fuse to form upper lip



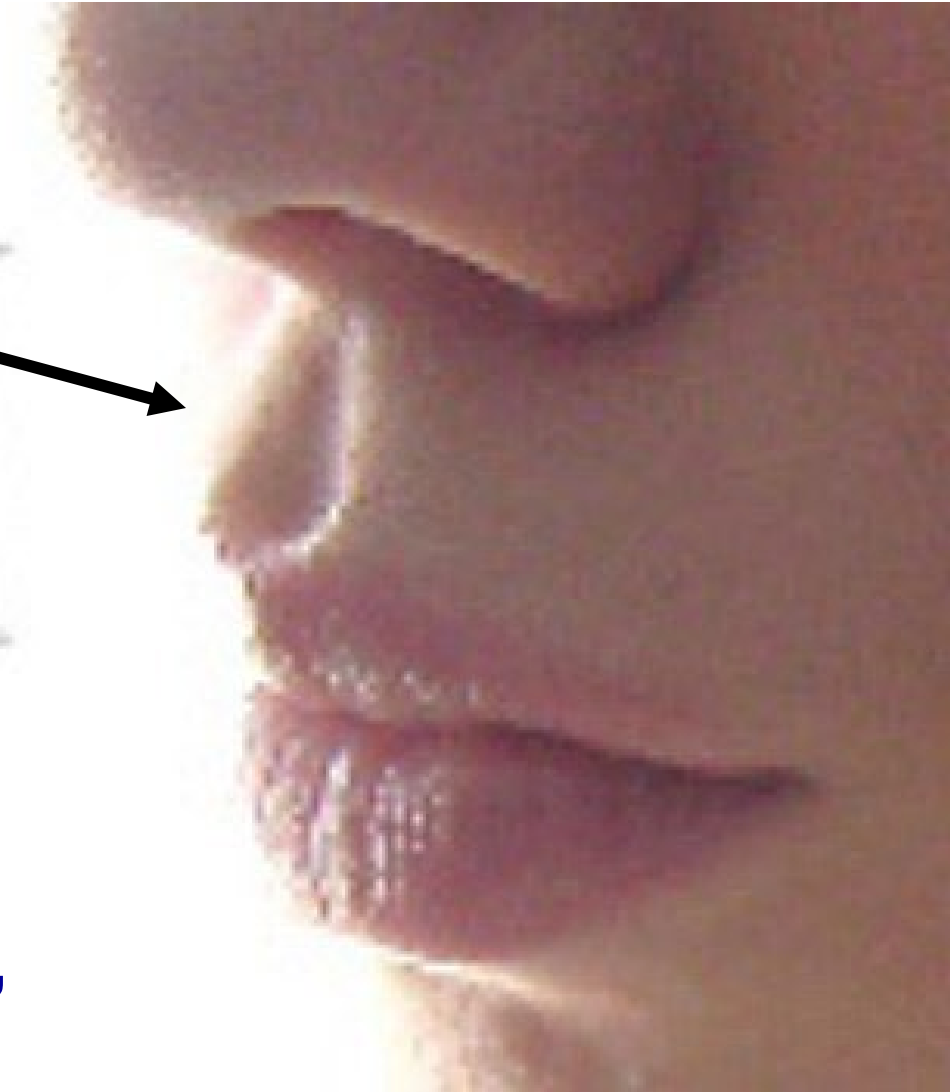
Terminology: process = prominence

Weeks 10-12

**PHILTRUM
OF LIP**



**philtron -
from
Greek to love,
to kiss**



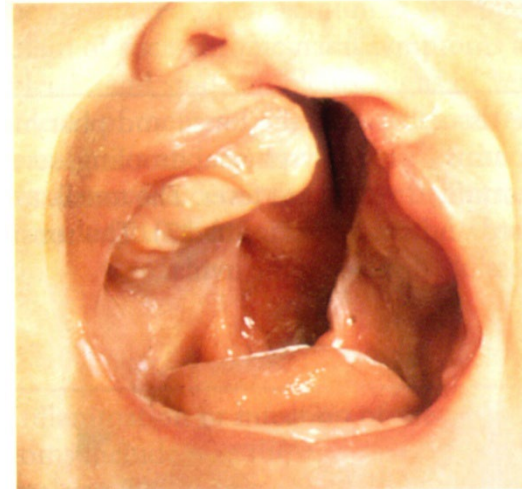
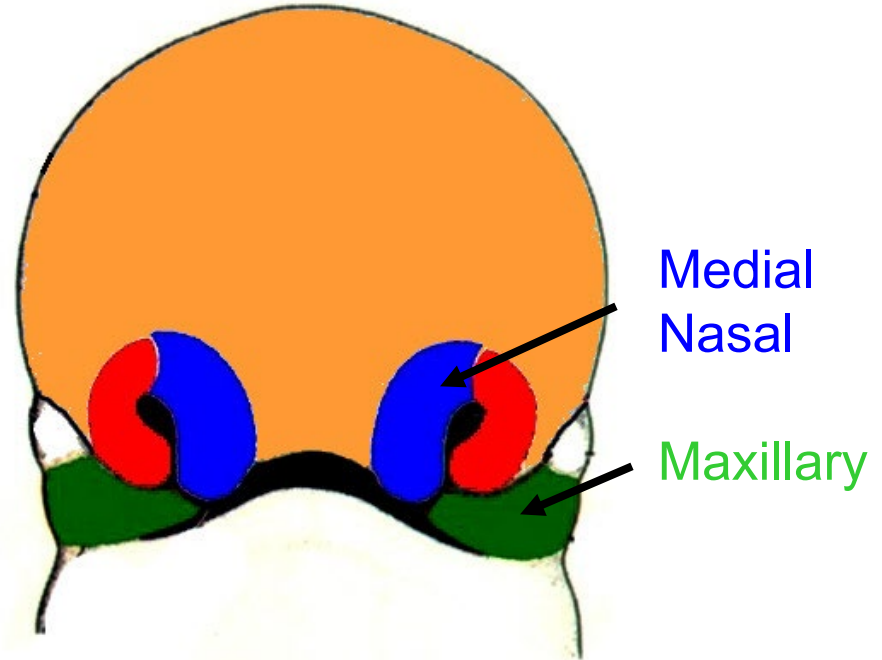
CLEFT LIP = CHEILOSCHISIS

BOARD QUESTION *

– failure of fusion of Medial Nasal Process and Maxillary process

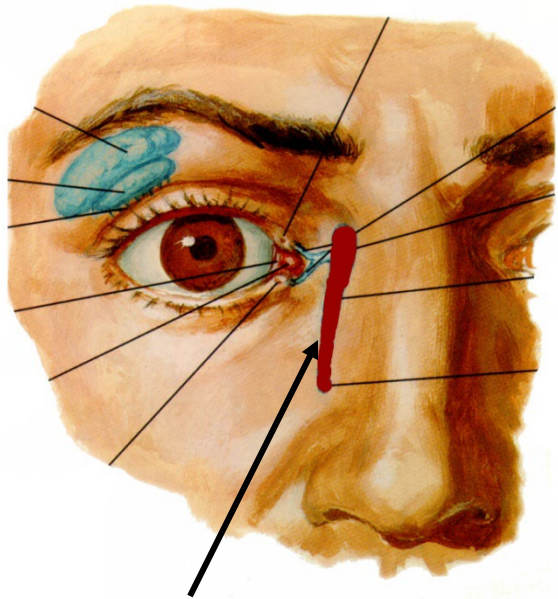
- 1/1000 Births, can be unilateral or bilateral
- At philtrum of lip

CLEFT LIP (cheiloschisis)
CAN OCCUR
IN COMBINATION WITH
CLEFT PALATE
(palatoschisis)



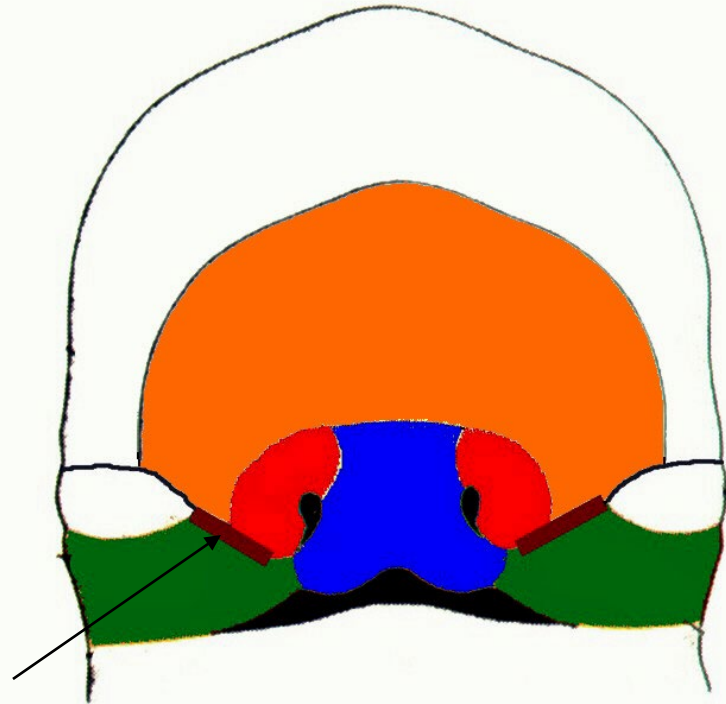
Gk. Cheilos,
Lip;
Pronounce -
KAI-LOS'-KESIS

5. DEVELOPMENT OF NASOLACRIMAL DUCT



NASOLACRIMAL DUCT

– connects anterior eye to nasal cavity



- Develops as solid cord from medial angle of eye to nasal cavity
- becomes canalized.

Obstructed Duct - failure of duct to canalize; opened surgically for tears to drain to nasal cavity

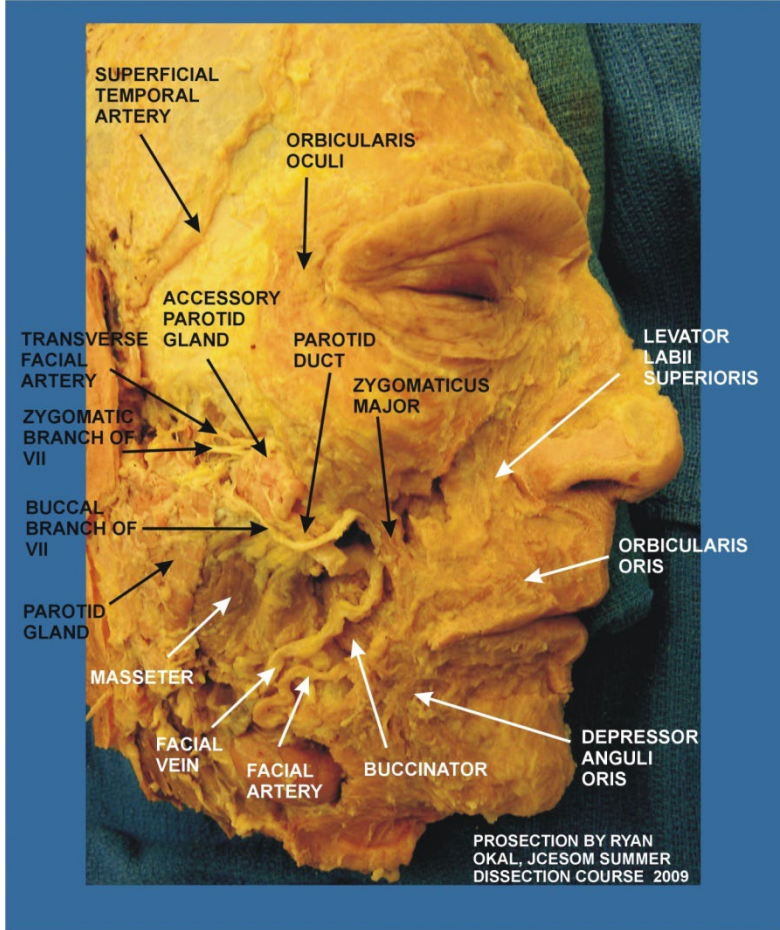
SUMMARY: SEE CHART OF CLINICAL EMBRYOLOGY OF HEAD AND NECK

CLINICAL EMBRYOLOGY OF HEAD AND NECK

Clinical Condition	Normal development	Abnormal	Signs/ Symptoms	Treatment
Cleft Lip (cheiloschisis)	Fusion of medial nasal and maxillary processes forms upper lip	Failure of fusion of medial nasal and maxillary processes	Cleft at philtrum of upper lip	Surgical repair
Malformation of nasolacrimal duct (dacryostenosis)	Duct forms as cord between maxillary and frontonasal processes; extends from lacrimal sac (at medial canthus of eye) to nasal cavity (inferior meatus)	Cord fails to canalize	Continuous flow of tears over lower lid onto face	Surgical repair
First Arch (Treacher Collins) Syndrome	First brachial arch forms skeletal elements: 1) malleus, incus 2) contributes to mandible (Meckel's cartilage)	Neural crest cells do not migrate into Arch 1	1) Mandibular hypoplasia 2) Conductive hearing loss 4) Facial malformation	Some surgical repair
Thyroglossal duct cysts	Thyroid forms as evagination at foramen cecum of tongue; tissue migrates ant. to Hyoid bone in midline of neck to location below Cricoid cartilage	Glandular tissue or cysts develop anywhere along path of migration	Mass in midline of neck	Surgical removal (remove tract to tongue)
Abnormal location/ Accidental Removal of parathyroid glands	Normally posterior to thyroid gland or embedded in it; develop from branchial pouches 3 and 4 Inferior parathyroid - pouch 3 Superior parathyroid - pouch 4	Can be located within thyroid gland or ectopic	Normally no symptoms; calcium imbalance If accidentally remove (Treat calcium imbalance pharmacologically, etc.

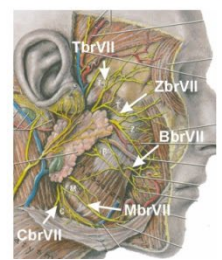
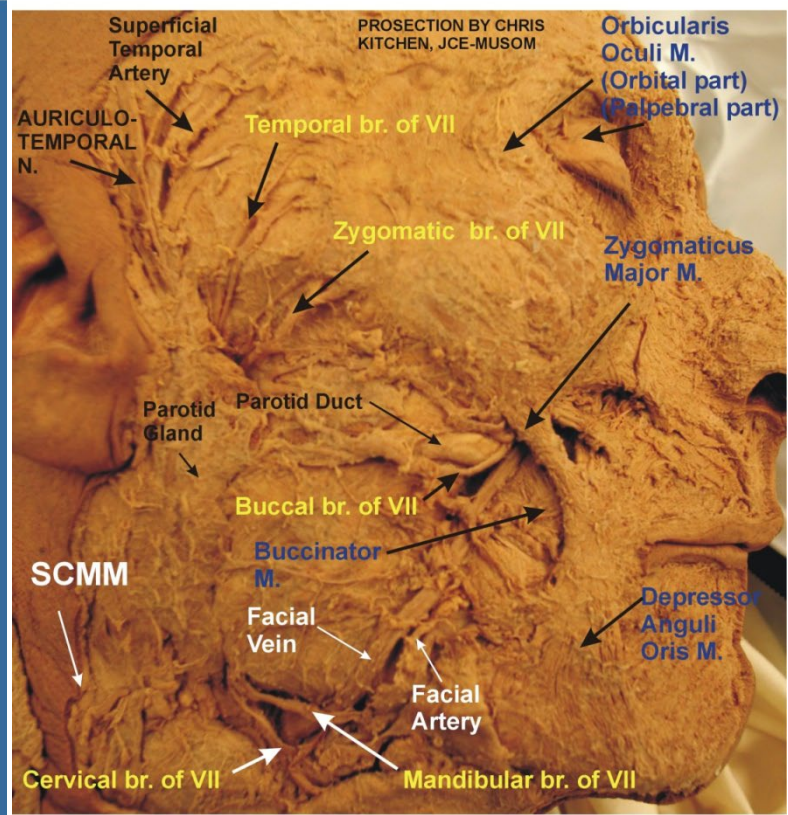
FACIAL MUSCLES

312



BRANCHES OF FACIAL NERVE (VII) AND SUPERFICIAL FACE

267



Superficial Temporal Artery
 Auriculotemporal Nerve
 TbrVII - Temporal branch of VII
 ZbrVII - Zygomatic branch of VII
 BbrVII - Buccal branch of VII
 MbrVII - Mandibular branch of VII
 CbrVII - Cervical branch of VII
 Orbicularis oculi (orbital part)
 Zygomaticus major
 Levator Labii Superioris
 Depressor Anguli Oris

Buccinator Muscle
 Facial Vein
 Facial Artery
 Parotid Gland
 Parotid Duct
 Sternocleidomastoid M.